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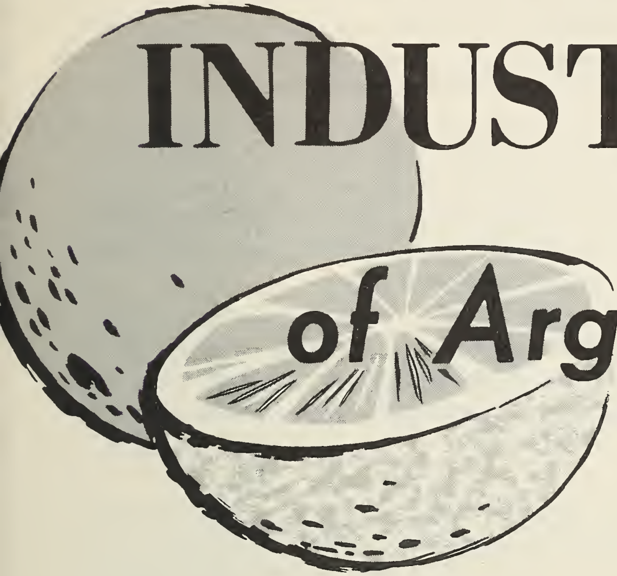
Foreign Agriculture Report No. 114

CITRUS INDUSTRY of Argentina



By J. Henry Burke

FOREIGN AGRICULTURAL SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

FOREWORD

Argentina is South America's second most important producer of export oranges. Exports to Europe are a recent development, but in the future Argentina may equal Brazil as a U. S. competitor in Western Europe's summer market.

This is a report on a comprehensive survey made in 1957. It evaluates the present situation and the outlook for production and exports of fresh fruit and citrus products. It supplements "The Fruit Industry of Argentina" by Fred A. Motz, published in 1942 as Foreign Agriculture Report No. 1.

This is one of a series of competitive studies of foreign agricultural producing areas being made by the Foreign Agricultural Service as an aid to U.S. agriculture in developing foreign markets.

DM Rubel
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JANUARY 1959

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CITRUS INDUSTRY OF ARGENTINA

By J. Henry Burke
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SUMMARY AND CONCLUSIONS

Argentina's commercial citrus acreage is estimated at 76,000 acres. Nearly three-fourths is planted to oranges, but some tangerines, lemons, and grapefruits are also grown commercially.

In 1956, the estimated harvested crop was 7.5 million boxes of oranges, 2.5 million boxes of tangerines, 1.4 million boxes of lemons, and 350,000 boxes of grapefruit. Only 2 million boxes of oranges, 600,000 boxes of lemons and 90,000 boxes of grapefruit were estimated to be of export quality in 1956.

Large quantities of oranges in Misiones and Corrientes and lemons in Tucumán, Salta and Jujuy were not harvested. By 1965, production in these districts probably will decrease and be supplanted by increasing crops from newly planted orange, tangerine, and grapefruit acreage near Buenos Aires. The 1965 commercial crop is forecast at 11 million boxes of oranges, 5.8 million boxes of tangerines, 1.5 million boxes of lemons and 825,000 boxes of grapefruit. The supply of export quality fruit may be expected to be 3.4 million boxes of oranges, 425,000 boxes of lemons and 325,000 boxes of grapefruit. New production of oranges and grapefruit will be of better quality than in the past.

All of Argentina's citrus areas are subject to frost damage. Drought is a hazard in many unirrigated areas. Tristeza is completing the destruction which began 20 years ago. Replanting on tristeza tolerant roots has created increased problems with other diseases. Important percentages of new plantings may not be permanently commercial. Scales, mites, and fruit flies are major pests.

Wages are low, but costs of imported equipment and materials are high. In 1957, the cash costs of orange production were estimated at 15-48 U.S. cents per box on the tree. Cash costs Buenos Aires were estimated at $1.13 to $1.92 per box; and at continental European ports they ranged from $2.95 to $3.74 per box.

In 1957 growers in export areas received 50 U.S. cents to $1.00 per box for oranges on the tree.

All domestic and export marketing is by private trade. In 1956 citrus utilization was nearly all fresh, for domestic consumption. Products and exports were very minor. The domestic marketing season is March to November. Oranges have been imported from Brazil in October, November, and December for over 40 years. In the future these imports will decline because of larger supplies of better quality Argentine oranges and rising import costs.

Exports of 125,000 boxes of citrus to Europe in 1956 inaugurated this trade. Germany, the Netherlands, and the United Kingdom were the most important customers. By 1965, European exports can reach 1 million boxes of oranges, 500,000 boxes of grapefruit and 100,000 boxes of lemons. The major export season will be for June to December arrival in Europe.

Argentina will be a source of new competition in Europe's summer orange market unless frost, drought or disease reduce future production below expected levels.

Argentine oranges have been well received selling at prices about equal to those of South Africa and higher than Brazilian oranges, but lower than those of California.

The outlook is for increasing orange exports from Argentina in competition with summer fruit. Argentine citrus exporters may improve export packs which could make the country a more important U.S. competitor than Brazil.

In 1956, about 600,000 boxes of citrus were used for products. By 1965, product utilization can increase to 1 million boxes forcing Argentina into the products export market. Oranges are a California type, high in acidity. Argentina has no advantages which would make the development of a large orange processing industry feasible. Lemons are suitable for products and large quantities of lemon juice and essential oil could be produced for export.

HISTORY

Citrus has been grown in Argentina since the 17th century. First plantings were probably made at missions along the Paraná River in what is now the Province of Misiones. The first commercial orange industry developed further down the Parana in the Province of Corrientes. Before 1900, seedling orange groves were planted near the town of Corrientes. All major extension of the industry has taken place since World War I.

The history of commercial citrus in Argentina is that of a series of disasters. The first seedling groves were killed by the fungus, gummosis. The groves were replanted on fungus-tolerant sour orange root. Between 1935 and 1955 most of these groves were killed by the virus tristeza. The present groves are largely replants after tristeza. On heavy soils Trifoliate orange root has been used, on lighter soils sweet orange, rough lemon, sweet lime, Rangpur lime, and Cleopatra mandarine. Trifoliate orange and Rangpur lime are susceptible to the virus exocortis and sweet lime to the virus xyloporosis. All other roots are susceptible to gummosis which killed the first commercial groves, thus completing the cycle.

ACREAGE

In 1957, total commercial citrus plantings were estimated at 76,000 acres. (Table 1) This does not include the noncommercial plantings which may be expected to go out of production in the next 10 years. The planted area consisted of about 70 percent oranges, 16 percent tangerines, 12 percent lemons and 2 percent grapefruit.

There should be little change in the total plantings by 1965. Lemon acreage will decline and grapefruit will increase. Orange plantings in Buenos Aires, Entre Ríos, Salta and Jujuy will increase, but in other areas will decrease.

Climate, water, and disease tend to limit the extension of commercial citrus planting, but the major limiting factor will be the quantity of fruit that can be sold at a profit.

Table 1.--Citrus fruits: Estimated total and commercial plantings by area, Argentina, 1957

Producing area	All citrus	Commercial citrus	
	Acres	Percent	Acres
Buenos Aires:			
San Pedro	20,000	50	10,000
Delta	2,000	75	1,500
Entre Ríos	47,000	75	35,250
Corrientes	62,500	10	6,250
Misiones	14,000	25	3,500
Tucumán	40,000	25	10,000
Salta and Jujuy	9,000	50	4,500
Other	20,000	25	5,000
Total	214,500	--	76,000

PRODUCTION

Official data on citrus production from 1940 to 1956 are given in Table 2. These data overstate actual orange, tangerine, and lemon production by 25 to 30 percent. They are more a measure of the on-the-tree crop rather than the quantity harvested.

In 1956, the harvested commercial crop was estimated at 7.5 million boxes of oranges, 2.5 million boxes of tangerines, 1.4 million boxes of lemons, and 350,000 boxes of grapefruit. In the Provinces of Corrientes and Misiones large quantities of poor quality oranges are not harvested. In the Province of Salta , of Jujuy and of Tucumán lemons are left on the trees both because of poor quality and lack of a market. This unharvested production illustrates the inability of these areas to compete and it portends decreasing production there.

In 1955, Argentina produced an estimated 2.7 million boxes of export quality citrus, 2 million boxes of oranges, 600,000 boxes of lemons and 90,000 boxes of grapefruit. (Table 3).

In the future, the source and quality of Argentine citrus production will change. (Table 3). In the Province of Buenos Aires, orange production will increase rapidly as San Pedro comes into production. There should be little change in tangerine, grapefruit, and Delta lemon crops. In Entre Ríos tangerine and orange production will expand, and lemon and grapefruit crops may be expected to remain about the same. In Corrientes, the ill-cared for seedling orange groves will rapidly go out of production. Tucumán and Misiones will also be likely to have smaller orange crops as their poorly cared for fruit will not be able to compete with the new areas near Buenos Aires. Orange production in Salta and Jujuy will increase, but lemon production there and in Tucumán will decline for lack of a market.

Total commercial production of oranges in 1965 may be estimated at 11.1 million boxes. This will be improved quality fruit and probably most will be harvested. Tangerine production may increase to about 5.8 million boxes as new groves at Concordia come into production, and may result in a surplus of tangerines and low prices. Total lemon production is likely to decrease to about 1.5 million boxes as interior areas go out of production. Total grapefruit production may be up to 800,000 boxes--about double present levels.

By 1965, the quantity of fruit of export quality may be 3.4 million boxes of oranges, 425,000 boxes of lemons, and 325,000 boxes of grapefruit, substantially increasing Argentina's export potential.

Following are Argentine words for the citrus fruits:

Naranjo (orange)
Mandarino (tangerine)
Campeona or bergamota 1/ (large tangerine)
Pomelo (grapefruit)
Toronja (shaddock)
Limon (lemon)
Limon dulce (sweet lemon)
Lima or limon sutil (West Indian lime)
Cidra (citron)

1/ Some fruits sold under this name may be hybrids or tangelos.

Table 2.--Citrus: Total production by variety, Argentina, 1940-56; Uruguay, 1945-56

Year	Argentina					Uruguay			
	Oranges	Tangerines	Total	Lemons	Grapefruit	Oranges	Tangerines	Total	Lemons
	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes
1940	9,870	4,721	14,591	859	94	--	--	--	--
1941	10,522	3,559	14,081	957	58	--	--	--	--
1942	14,072	3,637	17,709	1,735	196	--	--	--	--
1943	8,270	2,973	11,243	1,076	185	--	--	--	--
1944	8,188	2,948	11,136	1,001	110	--	--	--	--
1945	6,671	2,425	9,096	1,021	94	1,080	1,030	2,110	--
1946	7,688	3,004	10,692	1,134	105	1,630	1,021	2,651	272
1947	7,858	3,266	11,124	1,346	185	1,273	775	2,048	223
1948	9,388	2,964	12,352	1,410	176	1,201	656	1,857	140
1949	7,581	3,074	10,655	1,767	165	1,399	505	1,904	175
1950	8,696	3,026	11,722	1,691	204	1,106	457	1,563	164
1951	8,308	2,822	11,130	1,688	209	808	594	1,402	172
1952	9,423	2,413	11,836	1,535	289	835	441	1,286	167
1953	10,927	3,145	14,072	2,086	314	1,039	567	1,606	174
1954	10,736	2,947	13,683	2,172	375	787	472	1,259	174
1955	11,764	3,064	14,828	2,414	414	803	482	1,285	174
1956	13,612	3,149	16,761	2,579	476	882	529	1,411	191

PRODUCING AREAS

Argentina's major producing areas are Salta and Jujuy, Tucumán, Misiones, Corrientes, Entre Ríos and Buenos Aires. Each area is identified by province and district as it is discussed.

These observations were made in June, July, and August 1957.

SALTA AND JUJUY

This northern citrus area is near Bolivia about 1,000 miles by narrow gage railroad from Buenos Aires. Large commercial citrus plantings on sour orange root were made here in 1938 and 1940. Some of the original plantings are still producing.

Producing Areas.--The citrus-producing areas begin about 80 miles north of the eastern foot of the Andes at elevations of 2,000 to 3,000

Table 3.--Citrus: Total production and estimated production of export quality fruit, by variety and producing area, 1955 and projected estimates 1965.

Year and area	Total Production					Production of export quality 1/		
	Oranges	Tangerines	Lemons	Grapefruit	Total	Oranges	Lemons	Grapefruit
	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes
1955								
Buenos Aires	1,284	427	388	102	2,201	300	50	10
Entre Rios	2/ 500	2/ 1,025	2/ 51	2/ 23	1,599	300	25	30
Corrientes	4,790	294	103	95	5,282	0	0	0
Misiones	3/ 1,026	24	3/ 100	3/ 11	1,161	400	25	25
Tucuman	1,535	404	839	--	2,778	250	300	--
Salta and Jujuy	4/ 1,632	292	4/ 621	91	2,636	750	200	25
Other	996	598	243	97	1,934	0	0	0
Total	11,763	3,064	2,345	419	17,591	2,000	600	90
Total harvested 1/	7,000	2,500	1,300	350	11,150	--	--	--
1965								
Buenos Aires	4,000	400	400	100	3,900	1,000	50	25
Entre Rios	1,500	4,000	200	300	6,000	500	50	100
Corrientes	900	100	50	25	1,075	0	0	0
Misiones	1,000	25	100	100	1,125	250	25	50
Tucuman	1,250	300	400	--	1,950	150	200	--
Salta and Jujuy	2,000	200	300	250	2,750	1,500	100	100
Other	1,500	750	100	100	2,600	0	0	0
Total	11,150	5,775	1,550	875	19,400	3,400	425	275

1/ Estimated.

2/ These are official data. Actual production is about 1 million boxes of oranges, 2 million boxes of tangerines, 300,000 boxes of grapefruit and 200,000 boxes of lemons.

3/ Production in Misiones is at least 1.5 million boxes of oranges, 150,000 boxes of lemons, and 50,000 boxes of grapefruit.

4/ Production of 750,000 boxes of oranges and 250,000 boxes of lemons is more nearly correct.

feet. Mountains over 15,000 feet are within 50 air miles of citrus groves. Since most moisture comes from the Pacific, the eastern side of the Andes is rather barren. The Andean watershed serving the area contains many deposits of salt in old lake beds, creating a salinity problem in irrigation water.

In the Province of Jujuy major plantings are at the sugar estates of Ledesma and Calilegua. Smaller private groves are at Caimancito and Yuto.

Further north in the Province of Salta, major sugar estate plantings are at Urundel and Tabacal. Small private plantings are at Oran and Colonia Santa Rosa.

Citrus is a sideline to the large estates which are gigantic agricultural operations. One estate has over 300,000 acres, about 9,000 are irrigated and cultivated. Another estate contains about 110,000 acres, of which 16,000 are under irrigated cultivation. The estates maintain towns for their workers, containing 20,000 to 30,000 persons. These company towns offer the best housing and facilities in this remote area. One estate produces over 50,000 tons of sugar per year, employing about 10,000 persons.

Citrus Season and Climate.--Citrus blooms in August and September. Washington Navel oranges are harvested March 15 to April 15; Hamlins, April to May 15; Parson Brown in June; pineapple oranges in July; and Valencias and Lue Gim Gong, August to December.

The main harvest of lemons is in May and June, but there is also an October bloom which produces lemons for harvest in October and November of the following year.

Cultural Practices.--In the Provinces of Salta and Jujuy, most acreage is in very large groves operated by sugar estates. Plantings of 200 to 300 acres in a block are common.

The soils are mostly light sandy loams ideal for citrus and there is abundant additional land of this type which could be cleared and brought under irrigation for the expansion of plantings.

Winter and spring are dry and citrus must be irrigated. The summers are hot and humid with heavy rainfall from November to March. There is a general frost hazard. In 1955, 8 hours of frost damaged both fruit and trees. Some frost occurs every year in June and July. In July 1957 frozen fruit was cut in some groves. Weather reduces fruit grade. Sunburned fruit was observed and hail may also damage fruit and trees.

The most important cultural problem is replacing old groves budded on sour orange root stock with new groves on tristeza-tolerant rootstock.

Two planting methods are being used. The first is to interplant trees tolerant to tristeza in old groves on sour orange rootstock. Operating in interplanted groves presents difficult problems of cultivation. Growers do a great deal of hand hoeing around young trees, and it is sometimes necessary in summer to make 9 discings to chop up Johnson grass, which is hard to control.

Citrus competes for land with sugar and winter vegetables. Colonia Santa Rosa is Argentina's winter vegetable district, where tomatoes are produced in July - midwinter. Irrigated land here is the most expensive in Argentina, about $1,000 per acre in 1957.

Acreage.--In 1957 there were an estimated 4,000 acres of old trees left and about 5,000 acres of new plantings made within the past 6 years. Of this combined area about 4,500 acres in these two provinces were considered commercial.

New plantings are expected to continue and by 1965 Salta and Jujuy may have 16,000 acres of citrus on tristeza-tolerant rootstock. (Table 4) This will include about 11,000 acres of oranges, less than a thousand acres of tangerines, and about 2,000 acres each of lemons and grapefruit. Only about one-half of the new acreage should be considered as permanently commercial.

Production.--In 1956 the area produced about 750,000 boxes of oranges. All the oranges and most grapefruit were harvested, but probably not over 100,000 boxes of lemons were picked.

An extensive young orange grove on Tristeza-tolerant root is representative of the better plantings on sugar estates in the Province of Salta. The tree trunks are painted twice a year to control the fungus, Gummosis.

Orange production will increase in the next few years as new plantings come into bearing, but the net increase in production will be retarded by old groves going out of production. By 1965 a crop of 2 million boxes of oranges, 250,000 boxes of grapefruit, and 300,000 boxes of lemons is possible.

The long-range outlook on production is for another decrease once the present new plantings begin to decline.

The second, more drastic method is to remove all the old grove before planting new trees. This method presents fewer cultural problems, but some production is lost from old trees which are still productive.

Table 4.--Citrus: Estimated total plantings, Salta and Jujuy, 1957 and 1965

Area	1957		1965	
	Number of trees	Acres	Number of trees	Acres
	Thousands	Thousands	Thousands	Thousands
Sugar estates 1/	450	6	700	10
Small growers 2/	250	3	400	6
Total	700	9	1,100	16

1/ Includes Ledesma, Calilegua, Urundel, and Tabacal.
2/ Includes Oran, Colonia Santa Rosa, Yuto, Caimancito, and others.

One property was inarching young sour root orange trees with sweet orange to achieve immunity from tristeza. This practice has been successful in Brazil, but it is a rehabilitation method which requires large amounts of hand labor.

The most important rootstocks being used in replanting by large estates are sweet orange and Cleopatra mandarine; some rough lemon is also used. A few small growers still plant trees budded on sour orange root, but these plantings will probably be quickly killed by tristeza.

Trees used in the new plantings are all raised in grower-operated nurseries. In 1957, nurseries operated by sugar estates contained about 500,000 well-grown trees. One-year old budded orange trees were selling for about 50 U.S. cents per tree at one estate.

Under favorable soil and climatic conditions, nursery trees grow vigorously and Cleopatra mandarin seedlings may be budded 6 months after planting in the nursery and may be large enough for orchard planting 6 months later.

The large estates give little attention to preparing land for new plantings. About half have been made on land which was not leveled. All groves need irrigation. The low areas may be destroyed by gummosis because of excess water, while the high spots may be destroyed by drought.

There are several irrigation problems. The unevenness of some groves makes it impossible to properly apply irrigation water. Bermuda grass is not controlled in most groves, and when groves are cultivated additional soil is deposited on each grass patch increasing the unevenness of the land.

Brush is piled where a Tristeza-killed tree has been removed. Two dead trees are to be seen in the row on the right. Note the young orange interplants on tolerant root.

There is salt in the water in parts of the district. This could result in a major cultural problem as groves are irrigated over a long period of time.

Irrigation is mostly by a basin system around each tree. As the trees mature, furrows in the row middles will be used. Water is abundant and cheap. Large areas could be put under irrigation with pumped water.

All groves are cultivated with tractors and heavy equipment is used--discs are often 14 feet wide and cut deep--and all groves use fertilizer.

Diseases and Pests.--Tristeza, a fast spreading virus which attacks orange trees on sour orange rootstock, is the most important disease. It has destroyed most of the old groves planted on sour orange.

A sugar estate grove is planted on unleveled land in the Province of Salta. Such groves cannot be irrigated satisfactorily. Fully half the new plantings in Salta and Jujuy will not be permanently commercial for this reason.

Gummosis, which attacks trees on tristeza-tolerant rootstocks, will increase in importance as new plantings begin to mature. There was gummosis on some nursery trees. To retard the disease trees are planted high, often on a small mound. The tree trunks are painted with copper sulphate and lime two to four times a year.

The wide spacing of trees helps control gummosis by admitting sunlight to the grove.

Major pests are Florida red scale, white scale, and the Mediterranean and other fruit flies. Other pests are Argentine ants, aphids and leaf-cutting ants. Bluebirds and parrots also destroy quantities of fruit.

Scales are controlled with oil sprays; and flies, with spot bait sprays. In January and February, it is impossible to spray because of the heavy rain. The Mediterranean fruit fly is active from September to April in most sections. In warm areas, such as Colonia Santa Rosa, the fly is active over a longer period. It is impossible to obtain a complete control of the fruit flies because there are oranges and other host plants in the wild "monte" which surrounds the citrus area.

Varieties.--Large growers, who will supply most future commercial production, are planting proven varieties, such as Hamlin, Washington navel, Ruby Blood, Valencia, Lue Gim Gong, and a Shamouti type orange called "Jaffa." Ruby and Marsh Seedless grapefruit are also being planted. Some small growers are still planting a local seeded orange called "Criolla."

Table 5.--Salta: Estimated cash costs of operating a citrus grove, 1955

Item	Cost	Cost
	Pesos per hectare	U.S. dollars per acre [1]
Hand labor (cultivation and irrigation)	1,500	15.17
Spraying (scale and fly control)	1,250	12.65
Fertilizer, (15 kilos per tree)	1,500	15.17
Tractor work	1,000	10.12
Taxes	5	.05
Other (management, depreciation on machines and tools, housing, etc.)	1,000	10.12
Total	6,255	63.28

[1] Converted at 40 pesos to the dollar.

Costs.--Labor costs are increasing. In 1957, the basic farm wage was 67 U.S. cents per day. This was expected to be increased to about U.S. $1.00 per day before the end of the year. The large estates also furnish housing, free milk for children under 6 years of age, free medical care, and hospitalization. Farm workers also may have the use of about an acre of land. The fringe benefits may amount to more than the cash wage.

Wild "monte" which can be irrigated was selling for about $40 per acre in 1957. Cleared land which can be irrigated was selling for $101 per acre. Gravity water for irrigation costs only the ditches to bring it to the land.

The cost of clearing land was estimated at $20 to $40 per acre. The cost of clearing and planting citrus was estimated at about $51 per acre. The estimated cash cost of operating a grove in 1957 is shown in Table 5.

A conservative yield is 225 boxes per acre. Average costs of production in 1957 may be estimated at 28 U.S. cents per box on the tree.

Marketing.--The large sugar plantations have packinghouses. These are small but fairly well equipped installations. Fruit is washed, waxed, stamped with a brand name, on some estates, and place-packed in single-compartment, returnable, 45-pound boxes. Packers are paid 1 cent per box and earn about $1.50 to $1.75 per day. Packing facilities are adequate for export fruit, but additional facilities are planned, as well as a processing plant.

The purchaser in Buenos Aires pays a 50-cent deposit on the returnable box. The freight charge on returned empty boxes was 3 cents each.

The shipping time to Buenos Aires is 5 to 6 days. It is difficult to obtain rail cars. One estate observed that the way they received cars was to use those which brought empty boxes, fertilizer, and shook from Buenos Aires. The lack of rolling stock and the low capacity of the new narrow-gage railway may be a handicap as production increases.

While oranges have been well merchandized and bring premium prices, lemons are surplus. In some groves, the ground was covered with lemons. Lemons cannot be sold at a profit in Buenos Aires in June, July, and August in competition with the Delta area.

A typical small orange grove grown on sour orange root near Yuto in the Province of Jujuy. All of the 4,500 acres of citrus in Salta and Jujuy are irrigated.

Fruit Quality.--Oranges and grapefruit produced in this area are the best in Argentina. Oranges tend to be large, but they are clean, well colored, juicy, and have a fine flavor. They are of export quality. Lemons are of satisfactory quality but tend to be large.

Outlook.--This is one of the best citrus areas in Argentina, but it is so isolated that its potential will be limited by transport facilities and costs. The quantity of fruit produced will be limited by disease.

Production will not increase as rapidly as the extensive new plantings would seem to indicate. At least one-half of the new plantings may be expected to become noncommercial in the next 10 years.

In replanting, the tristeza-tolerant roots used are susceptible to the fungus, gummosis. Since much of the land used for the new planting has not been leveled, irrigation water cannot be controlled. Drought will be a major problem in the high areas and gummosis in the low ones.

Salta and Jujuy may be the most important Argentine source of export quality oranges by 1965, but are not likely to become an important source of citrus products.

TUCUMAN

This citrus district lies at the foot of the Eastern slope of the Andes in a "dry farmed" sugarcane area about 600 miles north and west of Buenos Aires. The nearby mountains rise to nearly 20,000 feet.

In 1957, it was estimated that the area contained about 2 million orange trees, 800,000 lemon trees, and 400,000 tangerine trees, all over 10 years of age. In addition, there are an estimated 1 million new orange trees less than 10 years of age. Only about 25 percent of all plantings are commercial.

Commercial plantings are estimated at 750,000 low producing trees, or about 10,000 acres. Orange trees are planted at the rate of about 100,000 per year which probably just about equals the loss of trees to tristeza. In 1956 the harvested crop may be estimated at 1 million boxes of oranges and 500,000 boxes of lemons. By 1965 orange production may increase to 1-1/4 million boxes, but lemon production will probably decline.

Citrus Season and Climate.--Oranges bloom from about August 20 to the end of September. Hamlin oranges are harvested from May to July and Valencias from October to February.

The summers are hot and humid. In five months, November to April, 85 percent of the season's rain falls. Spring and early summer are dry. Little rain falls in September and October when the crop is setting. Trees in need of moisture were observed in July 1957.

Some frost occurs every year. In 1955, citrus was seriously damaged, fruit was frozen, and some young trees killed by frost. Some frost damage was observed in July 1957.

Cultural Practices.--Citrus groves in Tucumán are small, nearly all less than 50 acres.

The soils are variable and range from sandy loams to heavy black types. All are rich in organic matter which helps sustain the citrus groves. In some areas there is a heavy clay subsoil which creates a root drainage problem.

The nine-year old orange grove at Tucuman shown above is typical of the stunted condition of most groves in the area.

Tucumán's orange groves are in a period of transition because of tristeza. All orange trees over 10 years of age are grown on sour orange rootstock. These will all be killed in the next 10 years as this scion-rootstock combination is subject to the virus. Many of these old trees are closely planted in the groves and pruned high like Arab plantings.

In the future, continued orange planting will be necessary to maintain production. Most trees used in new plantings are raised in local nurseries--1 and 2 year old budded trees were selling for 40 to 45 U.S. cents each in 1957. Most local nurseries produce trees which are not of commercial quality, by U.S. standards. Most nursery stock trees were stunted and poorly grown.

Some growers are purchasing orange trees grown on Trifoliate root in Buenos Aires Province. These trees cost 28 U.S. cents each delivered in Tucumán. In addition to being a poor root for Tucumán,

A five-year old grove of oranges is shown on the left, and a three-year old lemon grove on the right. Most of the 10,000 acres of commercial citrus at Tucumán receives little care and no irrigation.

these trees may have another virus, exocortis, and thus increase the disease problem in this area.

Cultural care is casual. When trees are planted, they are usually given one irrigation and are then left to depend on natural rainfall. The major cultural operation after a grove is planted is cultivation. Most growers do not apply fertilizer. Some young groves are interplanted with annual crops and cattle are grazed in some groves for weed control.

Many trees are stunted. They grow slowly. Trees at Tucumán, 5 years old, were the same size as those less than a year old in Salta and Jujuy. A 9-year old tree at Tucumán is about the same size as a 4-year old tree in the north. The production per tree at Tucumán is low and the fruit is small. Lemons seem to be able to stand Tucumán culture better than other varieties and good crops of rather large fruit are possible. Considering the lack of cultural care, some older groves are in surprisingly good condition.

It is estimated that not over 20 percent of Tucumán groves are irrigated. Conditions indicate that in most years some irrigation probably is necessary July through October. Gravity water is not as abundant as in Salta and Jujuy, but there is reported to be an excellent water table in most areas at about 20 feet.

The major disease is tristeza which is killing all sweet orange trees budded on sour orange root. Lemons are not affected by tristeza and all are planted on sour orange root. In 1957 the disease was spreading very slowly. It may be 10 or more years before all the old orange groves are destroyed. The disease seems more active in the better cared for groves.

Other diseases are gummosis and scab. Shamouti oranges budded on Rangpur lime develop exocortis, a tree-stunting virus. Shamouti fruit grown on this root had little acid or flavor.

Pests include California red scale, rust mite, the Mediterranean fruit fly, and other fruit flies. Oil sprays with malathion and other toxic materials are used for control, but most pest control is below usual commercial standards.

Deficiencies of zinc, copper and phosphorous are evident from tree condition.

Tucumán oranges were found to be of poor eating quality, but the interior quality of tangerines and lemons was excellent.

Rootstocks and Nurseries.--New orange plantings are on sweet orange, rough lemon, Cleopatra mandarine, Rangpur lime, and sour orange rootstock. Trifoliate orange is reported to be an unsatisfactory root in this area. The growers who are still planting orange trees budded on sour orange rootstock refuse to recognize the susceptibility of such trees to tristeza. These sour root plantings are in defiance of a government order which prohibits the use of this scion-rootstock combination.

Varieties.--Older orange plantings are mostly "Criolla," a group of seeded oranges.

Orange plantings made in the last 5 years are about one-half late varieties--Lue Gim Gong and Valencia--and about one-half other known commercial types such as Shamouti, Hamlin, and Ruby Blood.

Tangerines are called "comun." Lemons are an Italian type called Genova.

Marketing.--Purchases by fruit dealers are made in three ways. Some dealers buy the crop at the time of bloom as a speculation; others purchase it on the tree in February and March, shortly before the season's harvest starts; and some purchase by the 45-pound box.

Dealers resell fruit by the thousand or box. The major markets are Tucumán, Cordoba, Mendoza, Rosario, and Buenos Aires.

All citrus shipped to the deciduous-producing areas has to be treated for the control of the fruit fly by cold storage or fumigation, and is not waxed.

Considerable fruit is marketed in bulk or loose in boxes, orchard run, without washing, sizing, or grading. Fruit for Buenos Aires is washed, waxed, sized, graded, and place packed in 45-pound returnable boxes.

Packing plants were using Brazilian equipment to wash, wax, and size fruit. The two seen had an estimated capacity of about 2,000 boxes each per day.

Shipment is by rail, about 4 days to Buenos Aires and 5 to Mendoza. Only unrefrigerated cars are used.

Nearly all of the oranges and tangerines are harvested each year, but lemons are surplus and probably not over half of production is picked.

Local roads to the citrus areas are very rough. This lack of adequate local transport, the long distance from Buenos Aires, and the poor care of groves would make it very difficult to supply export fruit from this area. Damage to fruit in transport from the grove to the packinghouse creates problems of decay which makes export marketing hazardous.

Cost.--Wages at Tucuman were reported to be about $1.12 per day in 1957. Citrus growers have to compete with the sugarcane industry for labor.

Cash costs of operating a citrus grove do not average over $25 per acre per year. This is probably a generous estimate. Since the average yield is probably not more than a box per tree, the average cost of production is probably about 25 U.S. cents per box.

Processing.--A small processing plant is located in Tucumán which is making citric acid from lemons. It is reported that it also may make some essential oil of lemon.

Outlook.--Tucumán has little potential as a citrus export producing area. It may be expected to maintain about 10,000 acres of low-producing trees, which produce oranges for sale primarily in Tucumán and Mendoza. As late orange production increases, fruit may be sent to Buenos Aires in December, January, and February. Fruit flies and lack of refrigerated transport will be limiting factors in this trade. New orange plantings will about maintain production.

Lemon production will decline because of the lack of a market.

MISIONES

Producing Areas and Acreage.--Misiones citrus-producing areas, containing a total of about 14,000 acres, are scattered along the Parana river from near Posadas to above El Dorado, a distance of over 125 miles. Most lemons and grapefruit are planted near San Jose and are shipped at Pindapoy. Orange plantings are scattered--1,500 acres at Porto Leoni, 8,000 acres at Monte Carlo, 3,500 acres at El Dorado, and 1,000 acres near Posadas.

Because of neglected plantings, stunted young trees, and groves over 15 years of age which have light foliage and small production, only about 25 percent or 3,500 acres may be considered commercial.

Old groves becoming nonproductive probably about equal the area of new groves. Trade sources estimate that about 25 percent of the planted area is over 10 years of age, 50 percent is 5-10 years, and 25 percent is less than 5 years.

Production.--In 1956, orange production was estimated at 1.5 million boxes, lemons 150,000 boxes, and grapefruit 50,000 boxes. The total 1965 crop will probably be about 1 million boxes of oranges, 25,000 boxes of tangerines, and 100,000 boxes each of lemons and grapefruit. The poor care of most groves indicates that in 1965 the the production of export quality fruit may be only 250,000 boxes of oranges, 25,000 boxes of lemons, and 50,000 boxes of grapefruit.

Citrus Season and Climate.--The climate of Misiones is not stable and there may be considerable variation from one year to another. The heavy rainfall is in summer--December to March. Annual rainfall is 60 to 100 inches per year. The summers are hot, but the winters can be cold, and local frosts cause some damage. In addition to local frosts, freezes occur about every 11 years. Tree- and fruit-damaging cold waves occurred in 1933, 1945, and 1955. Hail also occasionally damages trees and fruit.

An orange grove near Monte Carlo shows light foliage, turf culture, and remains of logs from land clearance.

Rainfall is usually sufficient for citrus, but 5 months of below-normal rainfall in 1956 reduced the crop and resulted in small-sized fruit.

Citrus may bloom in July, August, or September. Navel oranges that bloom in July may be harvested in February and March. Valencia oranges may be harvested as early as July and may be tree-stored until December. Part of a tree-stored crop is lost because of damage from parrots and fruit flies.

Pests and Diseases.--Misiones has one of the most complicated disease and pest problems of any citrus area in the world. As an example, both Florida and California red scales are major pests. Purple and other scales also damage trees.

Rust mite, bud mite, 6 spotted mite, silver mite, and red spider are all serious pests. In addition, leaf cutting ants, locust, and aphids also cause some damage.

Fruit pests such as the Mediterranean fruit fly, other fruit flies, and parrots, destroy and damage fruit each year. The fruit flies are present in some parts of the district all year and in all the district for at least 10 months of the year.

Scale hatches are apt to be uneven making it difficult to obtain a satisfactory scale kill in one spray. Some of the mites have very short periods of incubation and increase rapidly. Rains wash bait sprays for fruit flies off the trees, making frequent applications necessary.

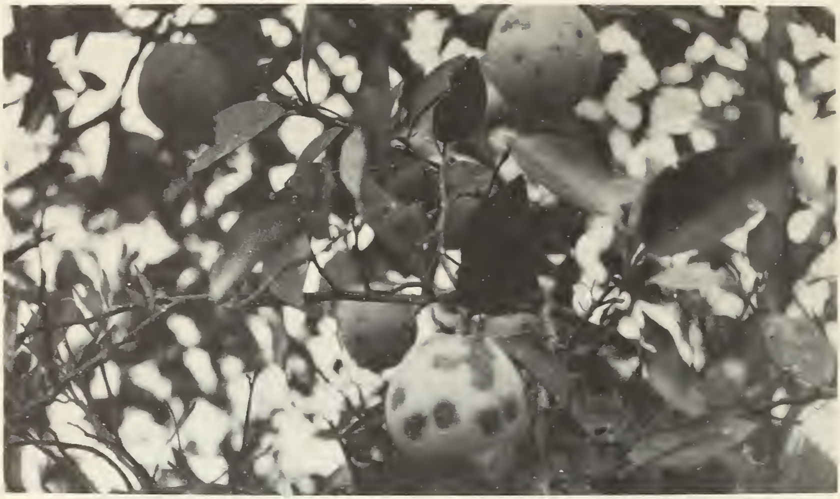
A pest control program consists of 1 or 2 oil sprays with added toxic materials, 1 dusting with sulphur or other pesticides after the petal fall, 2 copper sulphate sprays (at times with oil), one in April and another in July or August, and about 30 spot sprays for fruit fly.

Citrus areas are surrounded with jungle and a considerable degree of biological control of tree pests has been obtained in neglected groves. A spider is reported to be present which helps control California red scale.

Disease problems are serious. Tristeza has killed all sweet orange trees on sour orange rootstock. The use of tristeza-tolerant roots has increased the problem of gummosis control. In some groves bark is scraped and painted with copper sulphate solutions. Exocortis is found in some trees budded on trifoliate root. Scab is present, and some citrus canker (type B) is reported on lemon and grapefruit trees.

A major disease, which damages trees and fruit, is Leprosis Explosiva. This disease also exists on noncitrus plants in the area and is difficult to control.

Cultural Conditions and Practices.--Misiones has a red clay shallow soil. The northern part is heavily forested with jungle. When land is cleared, it erodes if clean cultivated. Since the soil is heavy and the rainfall high, the roots of citrus trees are near the surface. This condition makes it difficult to do any cultivation without damaging the root system. The shallow roots also make citrus susceptible to drought injury because the surface of the soil in the



A heavy infection of the fungus, Leprosis explosiva, has destroyed many trees in the Provinces of Misiones and Corrientes.

root area loses moisture quickly and cracks, causing additional damage.

No groves are irrigated. Citrus plantings are mostly on rolling land in locations where there is cold air drainage. The surrounding area produces tea, yerba mate, mandioca, tung, and hard and pulp woods.

Citrus trees have a rather short commercial life. Young trees grow and bear well until 7 to 10 years of age. When trees reach 15 years of age they seem to become dormant and have a low production of small fruit. It is possible that this condition results from the soil and moisture conditions which limit root growth.

Grove culture may be limited to hoeing around trees and cutting weeds and grass, fertilizing and spraying. Many groves are not fertilized. Some growers do a light cultivation to chop up weed growth. Others plow between the rows of citrus trees and plant mandioca or other crops. This causes root damage and erosion and results in low producing trees.

Citrus cultivation is rather primitive. The cultural care in most groves does not result in export grade fruit.

Varieties and Rootstocks.--All the tristeza-tolerant rootstocks are used in Misiones. On heavy soils, often near the Parana river, trifoliate orange root is used. In other soils, rough lemon and sweet orange are usual. In recent years, some large estates have started to use Cleopatra mandarine.

Most plantings are late oranges, Valencia and Valencia types, such as Lue Gim Gong and Calderon. The Calderon, grown near Monte Carlo, is reported to be later than the Valencia and a fine oval fruit with only a few seeds. There also are a considerable number of seedling sweet oranges which produce fruit with excellent flavor. Only a few early oranges are produced. Near San Jose there is a large planting of Marsh seedless and Ruby grapefruit.

Transport.--Transportation is a major problem. The wide gage railroad ends at Posadas. Most transport to the citrus area is from the railhead by truck to the Paraná river, and by river to the nearest river port, and again by truck to the citrus area. Thus fruit or freight from or to the citrus area must be loaded and off-loaded seven or eight times.

Besides many handlings, transport is rough and uncertain. All roads in the citrus areas and near Posadas are unpaved, red clay. They are extremely rough and dusty in dry weather and muddy when wet. Rain may stop truck transport for a week at a time.

The availability of railcars, which are all unrefrigerated, is uncertain. Cars from the deciduous-producing areas cannot be used because of different rail gage.

Fruit shipment from the main citrus areas to Buenos Aires by boat and rail requires 6 to 8 days. About 3 days of this is the rail transport from Posadas to Buenos Aires. Transport from the citrus areas to Posadas costs 25 cents per box and from Posadas to Buenos Aires, 32 cents per box.

Trade sources report that ventilated barges to transport oranges to Buenos Aires are being considered. If these are put into service, transport will still be slow and relatively expensive.

Marketing.--Cooperatives of growers operate in all the major producing areas. They pool the purchase of materials and their

This red clay road serves the entire Posadas-El Dorado citrus area containing about 3,500 acres of commercial citrus that is all unirrigated.

returns on fruit sales. As yet they have not engaged in marketing, except to sell fruit to established packers or wholesalers. Private firms have packed and sold most export fruit.

Packing facilities are fairly adequate. Three packing houses are located near Posadas and San Jose, one at El Dorado, and one at Monte Carlo. Three of these are modern installations which include color-add equipment and all are capable of packing export oranges.

Some domestic fruit is sent to Buenos Aires by rail in bulk. High decay is said to occur in most bulk shipments.

Some fruit is purchased by packers who, in 1956, paid $2.00 to $2.50 per 1,000 for oranges. There may be 2,000 oranges in a "thousand" of small fruit and less than 1,000 oranges in a "thousand" of large fruit.

The cost of marketing oranges increases. In Misiones, the cost to railhead, including picking, packing, and transport, was 69 cents per 70-pound box in 1954, 70 cents in 1955, and 93 cents in 1956.

Table 6.--Oranges: Estimated costs of marketing domestic and export fruit, Misiones, 1956

Item	Domestic oranges		Export oranges	
	Pesos per box 2/	U.S. dollars per box 1/ 2/	Pesos per box 2/	U.S. dollars per box 1/ 2/
Picking	2.2	0.06	2.2	0.06
Hauling	1.7	.04	2.0	.05
Box	8.2	.20	20.5	.51
Packing for transport to railhead	3.3	.08	--	--
Freight to railhead 3/	11.5	.29	10.0	.25
Packing for market	9.0	.22	10.0	.25
Rail freight to Buenos Aires	15.0	.38	15.0	.38
Precooling	--	--	5.0	.12
Total	50.9	1.27	64.7	1.62

1/ Converted at 40 pesos to the dollar.
2/ 67-77 pound box.
3/ Includes the return of empty boxes used for domestic fruit.

The cost of picking, packing, and delivery to Buenos Aires for domestic and export fruit in 1956 is shown in Table 6.

In 1956 and 1957, most of the oranges exported from Argentina were grown and packed at El Dorado, but the future export potential of this area is not large.

Fruit Quality.--Lemons of fine appearance and a very smooth peel and grapefruit of good quality are produced near San Jose.

Oranges are of good interior quality. In 1957, the fruits were small because of drought. In most seasons, orange sizes range from 150 to 216. (Table 7)

While the interior quality of oranges is good, the external appearance is often poor because of fruit-disfiguring pests and diseases. Trade sources report that in a normal season the discard of fruit for the Buenos Aires market is often 30 percent of the orchard

This is a young grapefruit grove near San Jose, Misiones.

Table 7.--Oranges: Representative sizes of export fruit, Misiones, 1956 1/

Size	Percent of fruit	Size	Percent of fruit
	Percent		Percent
126	3	216	22
150	21	252	9.5
176	32	288	2
200	10	324	.5

1/ Sample of about 10,000 boxes.

run pick and for export the discard may run to 50-70 percent of the fruit picked. In only a few groves could over 50 percent of the crop be used for export. Some neglected groves do not produce any fruit that could be sent even to Buenos Aires.

At El Dorado a few large, well cared for groves produce export oranges and a few groves near San Jose produce export lemons and grapefruit.

Costs.-- Wages of citrus workers range from about 70 to 87 cents per day. Housing and garden land may be furnished in addition to wages, and there is a 15 percent social security tax. Wages may be as high as $1.25 per day in the future. Competing crops, yerba mate and tea, require large numbers of workers and cause a shortage of labor.

The cost of fertilizer, pest control materials, and box shook is high. The rough roads increase the upkeep on trucks and cars. The cost of all vehicles and machines is about three times that of the United States.

Table 8.--Misiones: Estimated cash costs of operating an orange grove, 1957.

Item	Cost	
	Pesos per hectare	U. S. dollars per hectare
Hand cultivation	1,000	10.12
Fertilizer	0 - 4,000	0 - 40.47
Spraying, application, and material	1,000 - 2,000	10.12 - 20.23
Depreciation on machines, trucks, tools, etc.	1,000 -2,000	10.12 - 20.23
Other	- 500	5.06
Taxes	5	.05
Total	3,505 -9,505	35.47 - 96.16

The estimated cash cost of grove operation in 1957 ranged from $35 to $96 per acre. (Table 8) A grove having a cash cost of only $35 per acre would probably yield only about 75 boxes per acre. At this yield, the cash cost would be about 47 cents per box. When as much as $96 is spent in cultural care, the average yield is about 200 boxes per acre, at a cash cost of about 48 cents per box. Only about one-half of the fruit produced by growers who spend only $35 per acre may be of commercial grade, while a grove on which $96 per acre is spent may produce 75 percent commercial grade fruit. Cultural costs in Misiones are primarily to attain quality rather than quantity.

Processing.--There was no processing in 1957; however, there was some interest in establishing juice and essential oil facilities in the future. The degree of acidity and the preponderance of scale-covered fruit precludes the development of a competitive processing industry.

Outlook.--Misiones is mostly a marginal citrus-producing district and has a very difficult and expensive pest control problem. The short commercial life of trees and the modest yields of poor grade fruit make it a high cost producing area. The difficulties and expense of transport are major marketing problems. It will offer little competition.

CORRIENTES

This district is in low rolling land near the Paraná river. There are many small lakes as in Florida. It is the oldest commercial citrus area in Argentina and still the major source of oranges for the Buenos Aires market. Many of the present citrus groves are the third planting of citrus on the same land in the past 50 years. First, seedling orange trees were planted. As these died out because of gummosis, seedling oranges were replanted budded on sour orange rootstock. These trees were killed by tristeza. Replanting was again made mostly with "criolla" oranges budded on sweet lime root.

Cattle, cotton, and tobacco also are produced here.

Acreage.--In 1957, trade sources estimated citrus acreage at 60,000 acres of oranges, 1,000 acres of tangerines, and 1,500 acres of lemons.

Only about 10 percent, or 6,250 acres can be considered commercial because the trees are neglected. This area is rapidly going out of production.

Production.--In 1956, total orange production in Corrientes was estimated at about 4 million boxes. Of this, about 2.5 million boxes were marketed. About one-half were shipped by river boat and the rest by rail and truck. One-third to one-half of the production is not harvested. No export quality fruit is produced.

In the future, production will decrease rapidly and by 1965 total orange production will probably be less than 1 million boxes.

Citrus Season and Climate.--Average rainfall is over 50 inches per year. It is heaviest in the summer. Usually enough precipitation

This declining orange grove is typical of those in Corrientes. The small trees are budded on sweet lime root, the large tree is a sweet orange seedling.

occurs in each month to make irrigation unnecessary. In 1956 and 1957, a 10-month drought injured trees indicating that supplemental irrigation may sometimes be desirable.

The district is subject to frost. Frozen fruit and heavy foliage damage occurred in July 1957.

Oranges bloom in August and navel oranges are mature for harvest in April. Valencias are harvested in September and October; however, some fruit matures enough to be picked by late July.

Cultural Conditions and Practices.--The soils are mostly sandy loams. Groups are unirrigated despite available water supplies in the Parana river. Little fertilizing is done. California red and other scales are present. Rust mite, thrips, leprosis explosiva, and citrus canker (type B) disfigure fruit. Fruit flies also damage fruit; however, these pests are not as serious as in Misiones.

Many growers do not spray although pest control is a serious problem. The trunks of trees are sometimes painted with a copper sulphate solution as a protection against gummosis and other fungi.

Minor element deficiencies are prevalent.

Varieties and Rootstocks.--All orange trees over 15 years of age are a seeded, local orange called "Criolla." New plantings are all late orange varieties, including Valencia, Pera, and Lue Gim Gong.

The major root is Persian lime which probably is the same as the sweet lime used in the Middle East. This has been a weak root and xyloporosis is said to be present, but some new plantings are still being made on it.

Other roots being used include Cleopatra mandarine, sweet orange, rough lemon, and Rangpur lime. Trifoliate orange root cannot be used here, because of the light soils.

Marketing.--Most fruit is marketed through fruit buyers. In 1956, the price of oranges was reported to be about 30 U.S. cents per box, under the tree. The grower pull-picks the fruit.

Oranges are loaded into unrefrigerated rail cars at Saladas for bulk shipment to Buenos Aires.

The fruit buyer packs the best fruit in returnable boxes. The packed fruit may be washed, waxed, and stamped. Some fruit is sent to market orchard run, unwashed, or graded in field boxes. This orchard run fruit in bulk is said to sell for about 50 cents per box in Buenos Aires. Most oranges are still shipped in bulk in rail cars and river boats. There are small packing houses in Bella Vista and a large modern plant at Saladas.

Present marketing difficulties result from the type of orange produced. This type of fruit--a seedling--is no longer well received in Buenos Aires and finds it difficult to compete with better appearing budded varieties from other districts. The poor prices received make it unprofitable to care for the trees. This results in low production of scale-covered fruit.

Transportation.--Oranges are transported to Buenos Aires by both rail and river boat. In the past, river transport carried most of this freight, but as ships have worn out they have not been replaced. In 1957 only about half the fruit was carried by river boat. Water transport is preferred by some shippers because it is said to cause less damage to fruit.

Fruit shipped by rail must be trucked 25 to 40 miles over rough roads to the railhead at Saladas. The roads are unpaved and may be impassable when it rains. At Saladas, bulk fruit is dumped on the ground and loaded by basket into unrefrigerated rail cars. All traffic must be ferried over the Paraná River and since facilities are limited, fruit shipments may be delayed a day or more at the river crossing.

There is not much choice between the two methods of transport from the standpoint of cost. Considering the poor quality of the fruit produced and its low commercial value, freight costs of about 35 cents to 50 cents per 70-pound box are high.

The problem cannot be solved by truck transport because the rough roads would probably damage fruit even more than rail shipment and the ferry facilities over the Paraná River would still be limited.

Outlook.--Because of the type of fruit and the poor condition of fruit and groves, Corrientes is rapidly becoming unimportant as a producing area. Growers do not seem to be interested in producing good quality fruit.

Transportation costs and difficulties have added to the problem.

The seedling oranges have a good solids content for juice, but scale covered fruit produces contaminated juice and less oil.

This area is of no importance as a source of export fruit and probably will be of small importance in the future for either fresh fruit or juice.

ENTRE RÍOS

Extensive well maintained orange plantings near Concordia in Entre Ríos are a part of the 35,000 acres of commercial citrus in the area.

Acreage.--Entre Ríos is estimated to have the largest commercial citrus plantings in Argentina--35,250 acres in 1957. (Table 9) About 75 percent of total plantings are commercial. This is conservative, since some trade sources estimate the total planted area as high as 70,000 acres. Concordia is the most important area. Other groves are in Libertad, Santa Ana.

Federacion, and Monte Caseros. Monte Caseros is in the Province of Corrientes, but by geography and cultural methods is a part of this area.

About 60 percent of groves are less than 8 years of age. New plantings are mostly tangerines and late oranges. The largest groves are owned by Buenos Aires fruit dealers who buy, pack, and wholesale citrus. Many new groves have been planted with the assistance of 8 year, 5 percent, Central Bank rehabilitation loans for tractors and trucks.

Table 9.--Citrus: Estimated total plantings by variety, Entre Rios, 1957

Variety	Plantings	Variety	Plantings
	Acres		Acres
Common tangerine	25,000	Navel oranges	1,000
Dancey tangerine	1,500	Valencia oranges	8,000
Bergamota tangerine	1,000	Seedling oranges	6,000
Total tangerines	27,500	Total acreage	47,000
Grapefruit	3,000		
Lemons	1,500	Commercial acreage	35,250

Large areas of undeveloped land are available which are suited to citrus production. The potential size of this district is vast.

Production.--In 1955, production of the Concordia-Monte Caseros district was estimated at 1 million boxes of oranges, 2 million boxes of tangerines, 300,000 boxes of grapefruit, and 200,000 boxes of lemons. The production of export quality fruit was estimated at 300,000 boxes of oranges, 30,000 boxes of grapefruit, and 25,000 boxes of lemons.

By 1965, new plantings will come into bearing and production may increase to 1.5 million boxes of oranges, 4 million boxes of tangerines, 300,000 boxes of grapefruit, and 200,000 boxes of lemons. The quantity of export quality fruit probably will increase to about 500,000 boxes of oranges, 100,000 boxes of grapefruit, and 50,000 boxes of lemons.

Citrus Season and Climate.--Average rainfall is about 50 inches per year. The climate is milder than that in some other areas of Argentina. It is not as warm in summer as the North.

The area is subject to hail, frost, and drought. A tree-damaging freeze occurred in 1933. Fruit-damaging frosts occurred in 1943, 1945, 1955, and 1957. In July 1957, frozen fruit was cut and in some areas orange trees suffered 25 percent defoliation.

Oranges bloom August 15 to September 15. Valencia oranges are harvested from the end of September to December 15. Tangerines are harvested in June, July, and August.

Cultural Conditions and Practices.--The citrus area is on rolling ground. The soils are sandy loams similar to some Florida soils. The area seems highly suited to citrus production. Groves are planted about 83 trees to the acre. Most are well cared for. The trees are dark green and have heavy foliage.

In this high-producing orange grove near Monte Caseros psorosis was observed on many trees. All citrus here is raised without irrigation.

South of Concordia most properties are small consisting of 1 or 2 thousand trees operated by families. Groves near Libertad also are small properties. These are mostly seedling oranges; however, new plantings are budded varieties.

All cultivation is with tractors. Except for newly-planted trees, no irrigation is practiced. Heavy fertilization is necessary because of the light soil. Complete fertilizers are used. Pests are controlled with oil sprays and fruit flies with bait sprays.

Nurseries and Rootstocks.--Lemons are grown on sour orange root and all other citrus on Trifoliate orange and rough lemon.

Many new nurseries indicate that plantings may continue in the future. The prices of 1 year old budded trees were reported to be 10-16 U.S. cents each.

Varieties.--Most of the acreage is planted to common tangerines. There is also a small acreage of Dancey tangerines. A large tangerine, called Campeona or Bergamota, is grown also. This is said to be well received in the Buenos Aires market.

Most grapefruit is Marsh seedless; however, there are some Duncan, Foster, and Ruby Blush trees.

Older orange trees are mostly seedlings. Newer plantings are late varieties, such as Valencia and Lue Gim Gong. There is a small acreage of navel oranges and Italian-type lemons.

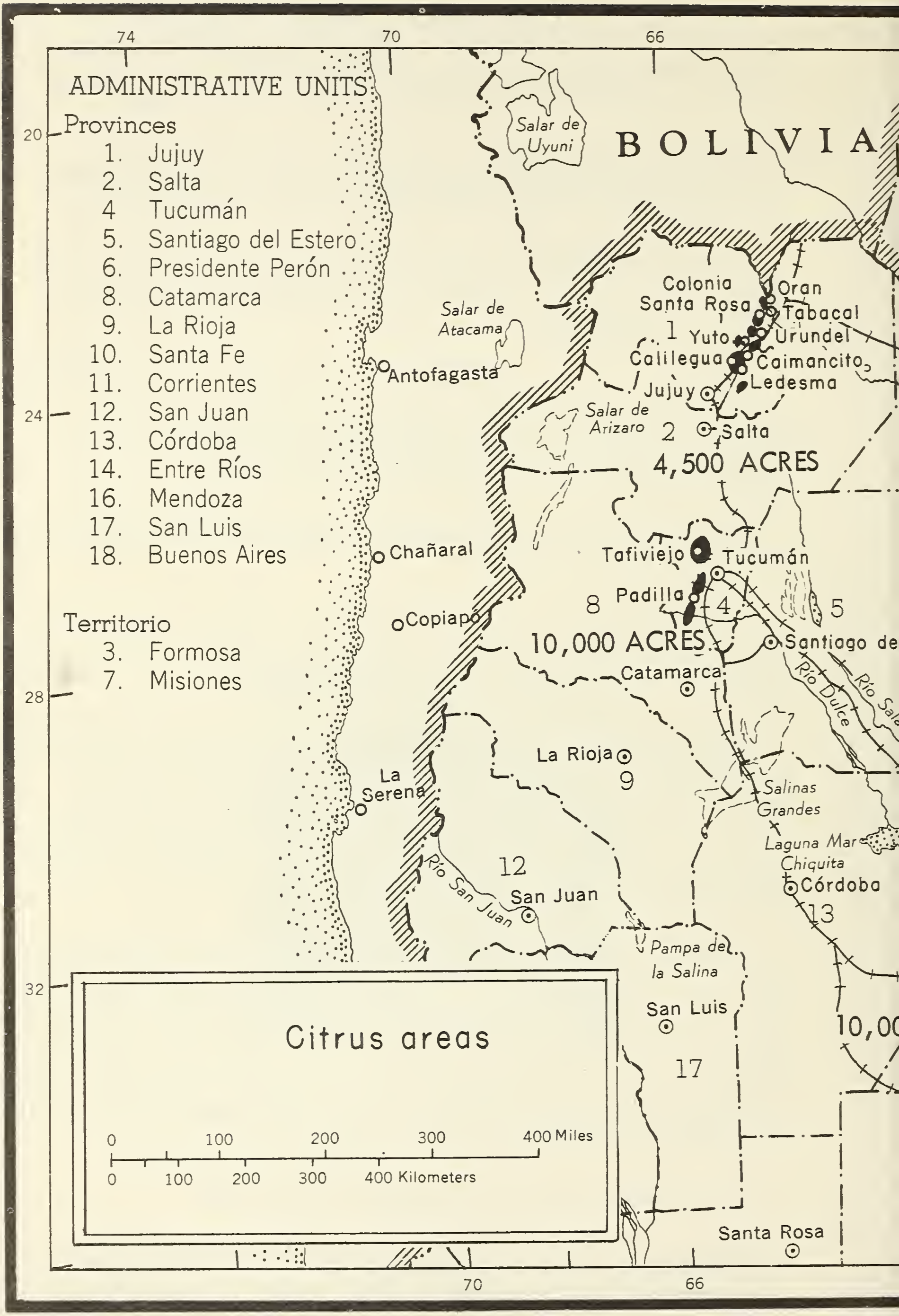
Pests and Diseases.--Tristeza has destroyed all sweet orange trees on sour orange rootstock. Exocortis is present in some trees on Trifoliate root, but disease-free strains are thought to have been found. Psorosis is present in some groves. It is doubtful if disease-free scion stock is being used in new plantings. Gummosis is not a serious problem because of the light soil.

California red scale is the most serious pest. This scale hatches four times a year and is said to be resistant to sprays and hard to kill. White scale and other scales are also present. The Mediterranean and other fruit flies are present about 10 months in the year. Only June and July are too cold for fly activity. Fly control is practiced usually in August to December and April to June. These are the seasons when fruit could be damaged.

Locust also do serious tree damage in some years.

Marketing.--Fruit is usually marketed through fruit buyers. In 1957, some fruit was consigned to fruit handlers in Buenos Aires. At present, most domestic fruit is stamped with a brand name.

Growers usually pull-pick fruit. In 1956 and 1957, prices to



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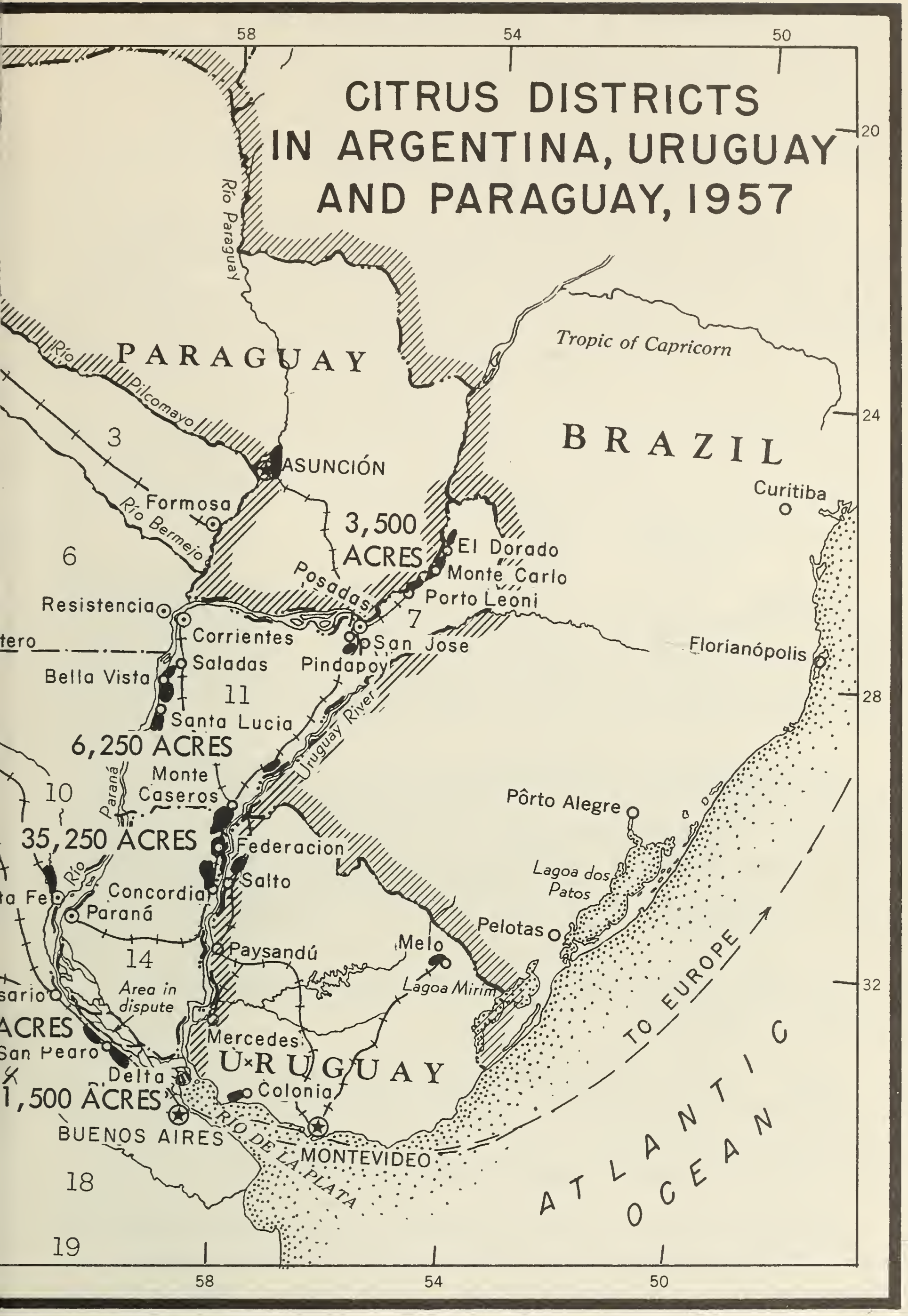
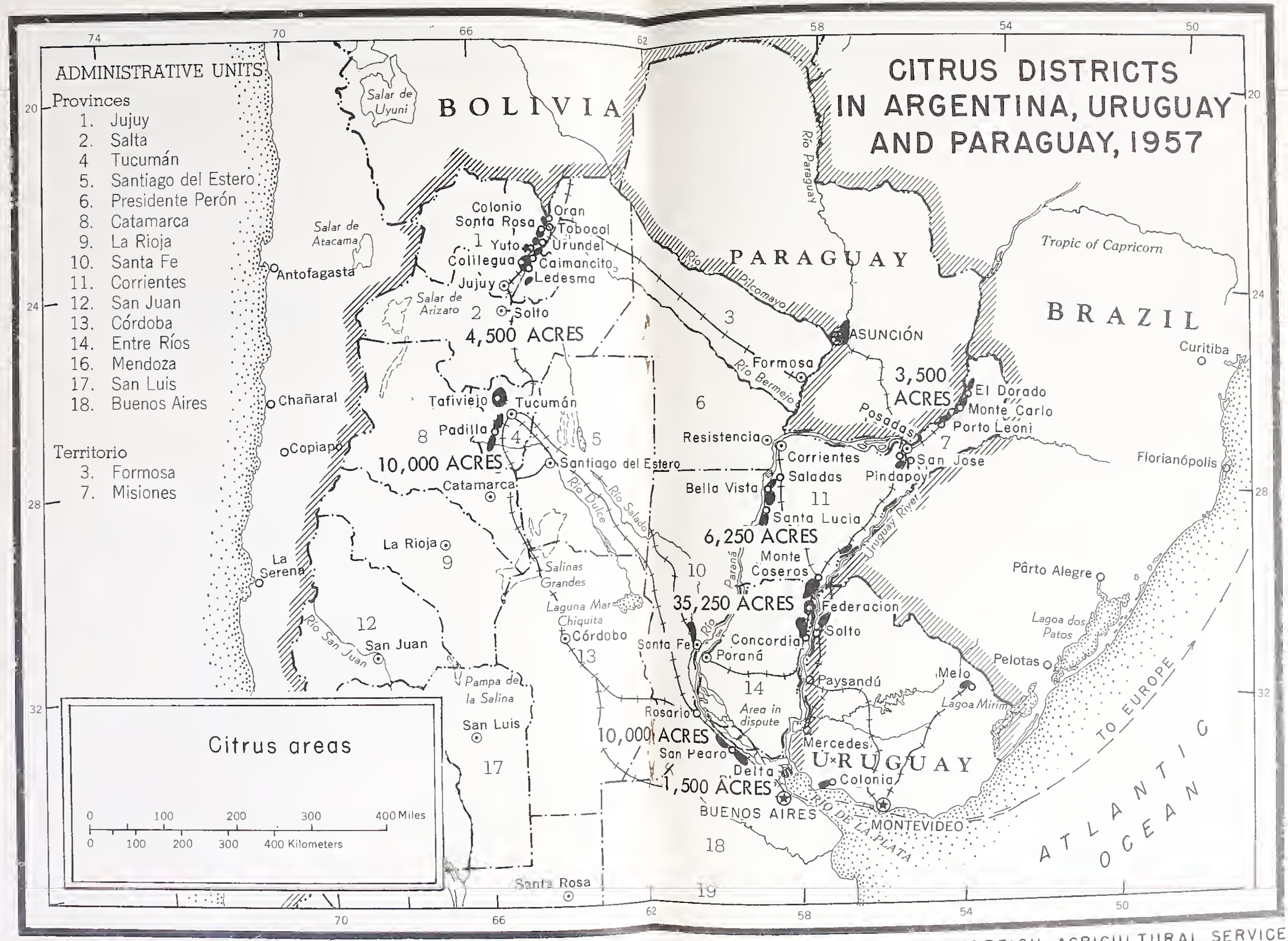


CITRUS DISTRICTS IN ARGENTINA, URUGUAY AND PARAGUAY, 1957

NEG. 1786 FOREIGN AGRICULTURAL SERVICE



CITRUS DISTRICTS IN ARGENTINA, URUGUAY AND PARAGUAY, 1957

U.S. DEPARTMENT OF AGRICULTURE NEG. 1786 FOREIGN AGRICULTURAL SERVICE

growers were about 95 cents to $1.11 per 70-pound box for Valencia oranges. The cost of picking, packing, and transport to market in Buenos Aires was said to be about 64 cents per box. At 1957 prices, a 70-pound box of Valencia oranges would cost the fruit buyer $1.75 delivered in Buenos Aires. Small quantities of fruit are still sent to market in bulk in rail cars.

In 1957, lemons were packed for export in a typical California two-compartment wooden box. Oranges for export were also packed in wooden two-compartment boxes. The boxes and packing were of good quality. The selection of the fruit was poor. It was not of uniform grade and some lemons had stems an inch long.

Excellent packing facilities are available. One very large modern packing plant can pack at least 10 cars per day. It has all modern facilities, including color-add. This plant and other modern installations are owned and operated by fruit buyers. As yet exports of lemons and oranges are small.

Transport.--This area is favorably located for transport. Unlike other citrus areas the local roads are quite good, with all-weather gravel surfaces. The highway to Buenos Aires also is fairly satisfactory for truck transport and direct rail transport also is available. Fruit can be delivered in Buenos Aires in 24 to 36 hours.

Fruit Quality.--Grapefruit and lemons are of good quality. Lemons from Entre Ríos have better keeping qualities than those from the Delta. The quality of tangerines is outstanding, much like that of the Mediterranean. Orange quality is good, although late in the season oranges tend to re-green. The good care of trees results in clean fruit that grades well.

The quality of the fruit produced is illustrated further by juice analysis. (Table 22)

Costs.--In 1957, land suitable for planting citrus could be purchased for $20 to $30 per acre. The cost of planting a grove, including preparing the land, buying and planting the trees, and all cultural care for the first year was estimated at $55 per acre.

Thus, the cost for a 1-year old grove, including land and trees, may not be over $85 per acre. The cash cost of operating a bearing orange grove in 1957 was estimated at $101 per acre. (Table 10)

Fertilizer is the largest item of expense. The costs shown permit the best cultural care. A grove so treated may be expected to average about 300 boxes of oranges per acre. At this yield the production cost per 70-pound box will average about 33 cents.

At 1957 costs and fruit prices, a grove had to produce about 2-1/2 70-pound boxes per tree to pay costs of operation.

Costs are increasing at the rate of about 10 percent per year.

Table 10.--Entre Ríos: Estimated cash cost of operating an orange grove, 1957

Item	Cost	
	Pesos per acre	U.S. dollars per acre 1/
Cultural labor	200	5.00
Spraying, fly, scale control and fungicide	800	20.00
Locust control	200	5.00
Pruning	50	1.25
Animal feed, trucks, and tractor operation	250	6.25
Fertilizer	1,750	43.75
Depreciation on machines and equipment	600.	15.00
Maintenance of buildings, equipment, and other	200	5.00
Taxes	5	.13
Total	4,055	101.38

1/ Converted at 40 pesos to the dollar.

Outlook.--Concordia is the most favorably situated citrus area in Argentina. With a potential production of over 4 million boxes of tangerines, it would seem certain that over production will cause lowered prices in the near future, and the acreage of tangerines will probably decline.

The acreage of oranges is likely to increase and it is possible that exports may be increased from this area.

Lemon production will probably remain small as there is no incentive for expansion. Lemons will be exported only when Mediterranean summer supplies are low. Quantities of lemon and orange juice could be produced here for export.

BUENOS AIRES--SAN PEDRO

The San Pedro district is about 125 miles north of Buenos Aires. The center of production is near San Pedro, but some plantings have been made from Lima to Rosario. Nearly all production is between the Pan American Highway and the Paraná River. Most plantings are within 6 miles of the river.

This is one of the fastest growing citrus areas in the world. An inspection of the area indicates that there are about 20,000 acres of citrus, or about 1.5 million trees. At least 90 percent of the groves are less than 5 years of age and about 50 percent of plantings are commercial.

A nursery at San Pedro near Buenos Aires contains 170,000 trees grown on Trifoliate orange root.

The large new plantings have been made by Buenos Aires fruit buyers who, being unable to obtain satisfactory quality oranges from Corrientes, have sought a new source of supply. Many of the new growers are not familiar with citrus production.

In 1956, about 750,000 boxes of oranges were produced. By 1965, San Pedro can produce 4 million boxes of oranges, a million boxes of which may be of export quality.

Citrus Season and Climate.--This is a late orange-producing area. Oranges bloom in September and October. Navel oranges are picked from March to August, although some may be held on the tree until December. The ability to hold fruit on the tree is an outstanding advantage of San Pedro. Navel oranges from this area may be marketed in volume from May to November.

In winter (June to September) the area is cold and subject to frost. This is probably the coldest orange-producing area in Argentina. In 1945, fruit was frozen and lemon trees damaged. Only groves on high ground or near the river have a sufficiently temperate climate for citrus. The river is warm, since it drains the temperate northern areas near Paraguay. It has a great effect on climate, since it is wide near the citrus area.

Frost damage could limit production on some of the new plantings in unproven locations. The appearance of twenty-year-old lemon trees would seem to indicate that the frost hazard is not too great in some parts of the district. In the frost of July 1957 considerable quantities of fruit were frozen, but tree damage was no greater than in Corrientes and Concordia, indicating that expanded commercial orange production is feasible in this district.

Cultural Practices.--Nearly all trees are on Trifoliate orange rootstock. With little care, the trees grow normally and show little stunting from the use of this root stock. The fruit is large and well colored. It tends to have a rather high acidity but good flavor. Most new plantings are large groves of over 100 acres. All are cultivated mechanically. It is not necessary to irrigate, so the land is not leveled. Most new plantings are in sloping ground to give cold air drainage. Groves are planted 75 to 90 trees to the acre. No fertilizer is used in most groves, but as trees mature some fertilization will probably be necessary.

Navel oranges in producing groves showed considerable variation between trees and types. Trees varied in size and shape, there were differences in leaf population, and some fruits were flat or oval in shape. Apparently bud selections have not been made with care.

There are many nurseries in the area. San Pedro produces nursery trees for many parts of Argentina. Some are sold in Tucumán, over 600 miles away. Trade sources estimate that in July 1957 there were about 5 million budded nursery trees in the area. The largest nurseries are near San Pedro. One nursery contained 170,000 budded trees and another 140,000. The trees were vigorous and well grown. In 1957, they were selling for 21 to 22 cents each in large quantities.

Diseases and Pests.--California red and other scales are present, but scale control does not seem to be a major problem. Oil sprays with parathion or malathion are used for scale control. One copper sulphate spray is applied in June, in bearing groves.

This new orange grove at San Pedro is a part of about 10,000 acres of new plantings.

Mediterranean and other fruit flies damage fruit in the fall, (March, April, and May). The flies become inactive with cold weather in June. Some spot spraying with bait sprays are used for control.

These balled trees are ready for planting.

Tristeza is not a problem because of the use of Trifoliate rootstock, but exocortis, another virus disease, is said to be present. If exocortis-free strains have not been selected for new plantings, a considerable percentage of the new groves may not long remain productive. The effect this disease may have on production in San Pedro cannot be evaluated. The answer will not be known before 1965.

The most common disease problem is gummosis. Copper spray on the trees and fruit seems to give a fairly adequate control.

Costs.--Costs in Buenos Aires province at San Pedro are low. Wages for farm labor in 1957 were about $1.12 per day. Workers do not receive housing for supplements in addition to wages. Truck transport from San Pedro to Buenos Aires costs only 12 to 14 cents per box.

Table 11.-- San Pedro of Buenos Aires: Estimated cash costs of operating an unirrigated orange grove, 1957.

Item	Cost
	U.S. dollars per acre
Cultivation (tractor and operator)	10.00 - 18.00
Fertilization 1/	15.00
Spraying:	
1 oil spray, 1 copper sulphate spray	10.00
Taxes (3.50 pesos per acre per year)	.10
Miscellaneous (housing, road care, depreciation, tools, etc.)	5.00 - 15.00
Total	25.10 - 58.10

1/ Some growers use no fertilizer.

The value of land at San Pedro was estimated at $81 to $223 per acre. Land near the river is the most valuable.

Taking the culture practices and costs into consideration, the cash costs of operation in 1957 may be estimated as ranging from about $25 to $58 per acre per year. (Table 11) There are about 90 trees per acre and a 15-year-old grove will yield 2 to 4 boxes per tree, or about 180 to 360 boxes per acre. At this yield, the estimated cash cost of production ranged from 7 to 32 cents per box. The average was about 15 cents per box.

This assumes a fertilization program of 1 pound of nitrogen per tree per year, pest and fungicide sprays, and a yield of only two boxes per tree.

Marketing.--This area has a distinct advantage in being the closest producing area to Buenos Aires, but it has problems, too. Fruit buyers purchase from the growers and truck the oranges in bulk or loose in boxes to Buenos Aires because there are no packing facilities in the district.

Lack of packing facilities and adequate local roads will complicate the marketing of the increasing production. The in-grove and local roads are usable only in dry weather. Rain can stop picking for a week.

This 15-year old navel orange grove at San Pedro gives evidence that late navel orange production can be attained here.

Present marketing methods will not be adequate in 5 years' time. It is likely that some fruit will remain unharvested in the future until adequate marketing facilities are developed.

Outlook.--San Pedro is difficult to evaluate. It is a rapidly growing area and is certain to be major competition for inland Argentina producing areas. It has a frost hazard, and exocortis may destroy many of the new plantings in a few years. Even with these considerations, it is certain to produce major quantities of oranges. The trees grow vigorously and many new plantings will be in production in 1965, at which time the area could produce 3 million boxes of oranges. It also has a potential for producing late navel oranges for export.

This typically situated delta lemon grove is a part of the 1,500 acres of commercial citrus.

The tip of the Delta formed by the junction of the Uruguay and Paraná rivers contains a small lemon area of about 2,000 acres which produces about 300,000 boxes of lemons of a variety called Genova, which appears to be an Italian type. About 75 percent of the plantings, or 1,500 acres, must be considered commercial.

All transport to and in the Delta is by boat. Even more than Surinam, this is the Venice of the citrus industry. All plantings are near canals to facilitate transportation and to protect them from frost. One grove had overhead sprinklers used as frost protection. These were used during the July 1957 freeze and the weight of ice broke many limbs. Groves are never more than 10 feet above water level.

Properties are small--2 to 10 acres. Many Delta groves are operated by families. They are hand cultivated. One man can care for about 2-1/2 acres. Drainage ditches are usually in every other row.

Trees are grown on trifoliate root. In spite of this, trees dttain normal size. The lemon groves are in excellent condition and crops of 10 boxes of fruit per tree per year are not unusual.

The major pest is California red scale. Leaf-cutting ants also damage trees. One oil spray is the usual control. Large quantities of fertilizer are used. One grower applies 5 pounds of dried blood and 4 pounds of super phosphate per tree in August and 3 pounds of dried blood and 2 pounds of super phosphate per tree in January. Copper sulphate sprays are used each fall (in June) as a fungicide.

It is difficult to obtain labor for Delta groves because of the isolation of water transportation. The Delta has no electricity.

Citrus Season.--Lemons and oranges bloom in September and October. Winter lemons are harvested from May to August, navel oranges from May to October, but the largest harvest for both lemons and oranges is June to August.

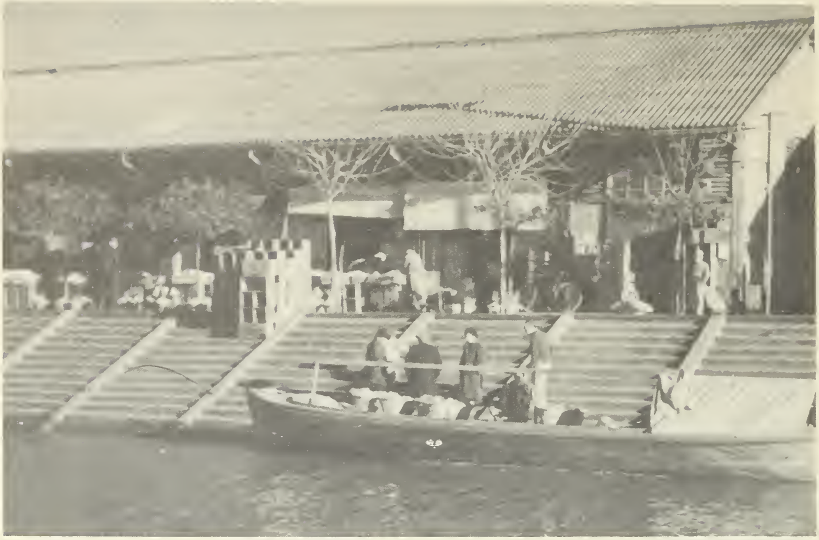
A lemon bloom is sometimes forced in July by applying nitrates. This produces lemons in the summer (February) when prices are high.

Lemons from the Delta may be exported in volume from May to about August 15, thus, the season of Delta lemons in Europe is from about June 1 to September 15.

Marketing.--Usually fruit is purchased at the grove. In early July 1957, growers were receiving 15 cents per box for oranges and about 40 cents per box for lemons. Fruit for the domestic market is sold at the Tigre Market about 45 miles by road from Buenos Aires. Domestic fruit is transported in bulk, burlap sacks, and returnable containers.

Some lemons are exported from the Delta. Both a two-compartment, full box, holding about 78 pounds of fruit, and a wooden half box, holding about 40 pounds of fruit, are used. The half-box pack is used mostly for London and the full-box pack for other export markets. The box shook is made from Delta-produced soft woods, which makes an attractive strong export box. In 1957, a two-compartment box cost 45 cents and the half box, 28 cents at the packinghouse.

Export fruit is wrapped in domestic manufactured paper, which is not diphenyl treated. Lemons are not washed or cured before packing. They are sight-sized and graded. These methods are



Delta-produced fruit is sold on the Tigre market.

similar to those in Sicily. In 1957, some fruit packed in this manner contained excessive decay on arrival in Europe.

All fruit is delivered to and transported from the packinghouse by water. Freight costs from the Delta packinghouse to La Plata for export were 25 to 26 cents per half box in 1957. Packers are reported to be paid $75 to $100 per month. In July 1957, exporters were receiving about $1.62 per half box of lemons, f.o.b. Buenos Aires.

The Delta, being close to Buenos Aires, is its chief source of lemons in June, July, and August. Interior lemon producing areas find it difficult to compete. Delta lemons tend to be large, but of excellent quality. Abandoned groves showed that some growers have not been able to maintain production under Delta conditions.

Costs.--In 1955, the cash costs of operating a grove were estimated at $87.05 per acre. (Table 12) Assuming the cost of operation in 1957 at about $100 per acre, the cost of production was only 25 cents per box at a yield of about 400 boxes per acre. Some groves yield twice this quantity.

The half-box is used for lemon exports to England. The lemons in sacks are ready for transport to the Buenos Aires market.

Table 12.--Delta of Buenos Aires: Estimated cash cost of operating a lemon grove, 1955.

Item	Cost	
	Pesos per acre	U.S. dollars per acre 1/
Cutting weeds	450	11.25
Fertilizer	1,020	25.50
Disease and pest control	624	15.60
Pruning	200	5.00
Replanting	14	.35
Maintenance of building	79	1.98
Repair of machines	175	4.37
Management and other	100	2.50
Depreciation of machines	810	20.25
Taxes	10	.25
Total	3,482	87.05

1/ Converted at 40 pesos to the dollar.

Near Buenos Aires in the delta is a hand-operated citrus packinghouse. There is no electric power. All transport is by water.

Outlook.--Because of its proximity to Buenos Aires, the Delta will remain its major source of lemons from May to August. It is primarily a domestic producing area, but it could supply as many as 50,000 boxes of export lemons for Europe when Mediterranean summer lemon supplies are below normal. Lack of facilities for fruit curing and fungicide treatment will limit the export potential in the near future.

It is unlikely that total production will increase to over 500,000 boxes per year.

SUBSIDIARY PRODUCING AREAS

There are two subsidiary producing areas in adjacent countries which have a relationship to Argentina's future citrus development. These are Paraguay and Uruguay.

PARAGUAY

Paraguay, an island, primitive tropical country of about 1.5 million persons, has had a small commercial citrus industry since 1910 and some citrus has been grown there since the 17th century.

The first commercial orange industry consisted of seedling varieties which supplied most production to 1950, when disease destroyed most of the industry. A fungus disease Leprosis explosiva killed 90 percent of the old seedling orange groves and tristeza killed all trees on sour orange root.

New plantings are being made mostly on sweet orange stock. Orange varieties being planted are the early Washington navel, the small Brazilian navel, the Bahianinha, and the late Natal and Lue Gim Gong, both Valencia types. Some Duncan and Marsh seedless grapefruit, and a few limes and acid lemons are also being planted.

Most commercial production is near Asunción, the capital city of about 250,000 persons, which is Paraguay's major market.

In 1956, total production was estimated at about 500,000 boxes of oranges, 100,000 boxes of grapefruit, 150,000 boxes of tangerines and 50,000 boxes of lemons. Orange production in 1956 was about half total production in 1930.

Production is probably not higher than estimated because exports are small and Paraguay's people, with low purchasing power, cannot consume a large quantity of fruit. Asunción does not consume over 200,000 boxes of oranges per year.

Major production comes from small plantings which receive little care and which produce low yields of scale-covered, disfigured fruit. Only a small percentage of fruit is clean enough for export, and the quantity suitable for juice is also limited.

Some increase in orange and tangerine production may be expected, but the degree will depend on demand in the local market. In the past, Paraguay produced oranges for export when its fruit only had to compete with equally poor seedling Argentine oranges from Corrientes.

Until 1935 Paraguay produced oranges mainly for export, mostly to Argentina. From 1920 to 1934 Paraguay shipped, via river, 500,000 to 1 million boxes annually to Buenos Aires. As Argentina developed new producing areas and improved varieties, trade decreased and by 1952, orange exports to Argentina ended. Paraguay has exported small quantities of oranges and grapefruit to Western Europe, usually the United Kingdom. This trade has been sporadic and has never exceeded 100,000 boxes per year.

Paraguay still exports some grapefruit to England in summer. And it shipped 27,000 boxes to Argentina in 1956 (March through July). The interior quality of Paraguay's grapefruit is good, but its external appearance is usually poor. All export fruit must be transported from Asunción to Buenos Aires, the export port, by rail in unrefrigerated cars, which sometimes causes losses from decay during transit. This trip of about 900 miles requires a week or 10 days and costs about 50 cents per box--more than the cost of producing the fruit. In 1956, Paraguayan grapefruit sold in Buenos Aires March to August brought an average of about $1.50 per box and at no time more than $2.15 per box.

The new groves may be expected to have a short commercial life as gummosis attacks the roots and Leprosis explosiva the tree tops. Little clean fruit will be produced because of fruit disfiguring pests and diseases. Transportation will continue to be a major problem.

Paraguay has little potential as a producer of export fruit and may be expected to produce primarily for its limited domestic market. Not over 50,000 boxes of grapefruit per year are likely to be exported to Argentina and Western Europe. Part of the grapefruit exports to Argentina will be accidental because they will be the sale in Buenos Aires of fruit intended for export to Europe, but which arrive at port too decayed to ship.

The only citrus products which will be produced for export are essential oil of orange, orange flower oil (Neroli) and orange leaf oil (Petit Grain). These products are produced in small field plants.

URUGUAY

Uruguay is a country of about 3 million persons, a third of which are centered around Montevideo. The largest citrus producing area is 300 miles from Montevideo, at Salto, but the narrow gage railway facilities are adequate for transporting fruit and the roads are some of the best in South America. Other small areas are located near Melo and Colonia.

In 1956, Uruguay produced about 882,000 boxes of oranges, 530,000 boxes of tangerines, and 191,000 boxes of lemons. (Table 2) Orange and tangerine production has been cut in half since 1946 by tristeza, which has been killing all trees grown on sour orange rootstock. Growers have been slow to replant, but that has been done on Trifoliate orange root where replants are made. Some of the new plantings are affected with the tree-stunting disease exocortis, indication that the disease problem will continue.

At Salto, which is across the Uruguay River from the important Argentine citrus area at Concordia, citrus is raised without irrigation on light loam soils. Most production is from April through September. During the hot summer months (October - March) the market is supplied with fruit from out-of-season blooms and with oranges cold-stored in Montevideo.

Salto has a frost problem. Periodic freezes damage fruit and trees, usually in July and August. In July 1957, about half the fruit on the trees was frozen.

Another problem is pests. California red scale, fruit flies, and mites are the most serious.

There are large groves near Salto, which use modern cultural methods and where export quality fruit can be produced. In the past small quantities have been shipped abroad. From 1920 to 1935, oranges were sent to Argentina and from 1935 to 1938 small shipments were made to Western Europe.

In 1957, however, the government refused to issue export licenses for oranges to prevent domestic shortages.

On the whole, there has been little incentive to export, because domestic prices are good. The average wholesale prices of citrus in Montevideo, July 1956 to May 1957 1/ are reported as: Oranges, $2.45 per 70-pound box; lemons, $2.86 per box; and grapefruit, $4.28 per box.

1/ Report of Mr. LeRoy La Master, Agricultural Attache. Converted at the free rate of exchange--4.09 pesos to the U.S. dollar.

In recent years Uruguay has imported small quantities of lemons from Argentina. From January to June 1957 imports totaled 10,000 boxes.

Uruguay can produce good quality fruit with proper care and good yields can be obtained with fertilization. A large percentage of present groves have not come into full production, when these young groves reach maturity, the country can produce 1.5 million boxes of oranges--probably by 1965. As supplies increase, domestic prices probably will drop and Uruguay may attempt to export oranges to Europe in the summer (May-September). Since Uruguay has no historic market, exporters will face the problems of new market development.

This orange tree budded on sweet lime root is affected with virus disease, Xyloporosis. The concave deformities on the trunk may be noted.

Imports of lemons from Argentina will end as domestic production increases. Uruguay will not be a potential market for Argentina's expanding production.

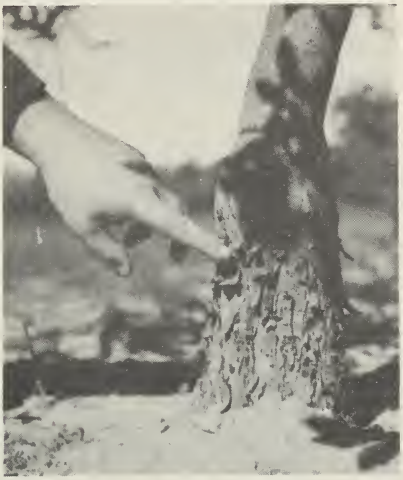
EXPERIMENT STATIONS

The Argentine Ministry of Agriculture maintains two experiment stations devoted primarily to citrus; one at Bella Vista, Corrientes, and the other at Concordia, Entre Ríos. The better equipped station is at Concordia.

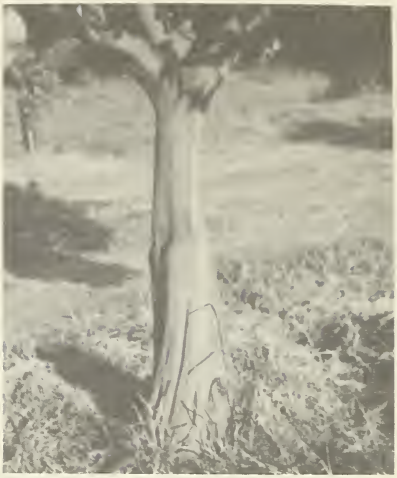
Field trials of rootstocks and fruiting varieties are being made in both stations. Fertilization experiments are also being carried on.

Some experimental work is also being done at Tucumán by the Province of Tucumán.

There seems to be little application in Tucumán and Corrientes of the improved citrus cultural practices developed by the experiment stations.



The tree-dwarfing virus disease, Exocortis, caused this bark outbreak.



This bud union deformity resulted from the budding of sweet orange on Trifoliate orange root.

Table 13.--Citrus: Some production costs, Argentina, 1957

Item	Unit	Cost	
		Pesos	U.S. dollars 1/
Land suitable for citrus:			
Buenos Aires (San Pedro)	Hectare	8,000 - 22,000	--
	Acre	--	81 - 223
Entre Rios (Concordia)	Hectare	2,000 - 3,000	--
	Acre	--	20 - 30
Salta (Irrigated)	Hectare	10,000	--
	Acre	--	101
Farm wages	Per day	27 - 45	68 - 1.12
Fertilizer: 2/			
Chile nitrate	Metric ton	1,885	--
	Short ton	--	42.75
Sulphate of ammonia	Metric ton	2,000	--
	Short ton	--	45.36
Spray material: 2/			
Copper sulphate	Kilo	13.25	--
	Pound	--	.15
Spray oil	Liter	3.30 - 3.60	--
	U.S.gallon	--	.87 - .95

1/ Converted at 40 pesos to the dollar.
2/ F.o.b. Buenos Aires.

COSTS

In Argentina land, water, and wages are inexpensive. All imported equipment and materials are high. If the peso continues to depreciate, the cost of tractors, trucks, fertilizer and spray material will continue to increase in pesos. This will be an important disadvantage to growers producing fruit for sale in Argentina's domestic market.

Some unit costs are given in Table 13.

Freight Rates.--The freight cost from Tucumán, Salta, Jujuy, and Posadas to Buenos Aires is over 30 U.S. cents per box. (Table 14) These areas are all over 700 miles from Buenos Aires. The

Table 14.--Citrus: A comparison of freight rates from indicated producing areas to Buenos Aires, Argentina, 1957.

Province and city	Transport	Miles	Freight rate to Buenos Aires			
			For 10 tons		For 15 tons	
			Pesos per m.t.	U.S. dollars per box 2/	Pesos per m.t.	U.S. dollars per box 2/
Salta: Salta	Rail	995	416	0.38	340	0.31
Jujuy: Jujuy	Rail	1,008	416	.38	340	.31
Tucumán: Tucumán	Rail	718	359	.33	293	.27
Misiones:						
Posadas	Rail	710	356	.32	290	.26
Posadas	Boat	---	255	.23	---	---
Corrientes:						
Saladas	Rail	590	345	.31	282	.26
Bella Vista	Boat	---	173	.16	---	---
Entre Ríos:						
Concordia	Rail	338	193	.17	159	.14
Concordia	Boat	---	110	.10	---	---
Buenos Aires:						
San Pedro	Rail	93	125	.11	106	.10
San Pedro	Truck	---	155	.14	---	---

1/ Minimum load 5 metric tons.
2/ Computed at a gross weight of 80 pounds per box. Converted at 40 pesos to the dollar.

freight cost from Concordia of 17 U.S. cents per box and San Pedro of 14 U.S. cents per box, by truck, is a distinct advantage for these areas. (Table 14) Boat transport is cheaper but it is also slower and not always available.

Inadequate rail service, in shortage of rail cars and the slowness of transport, is a major factor limiting the development of an export citrus industry in Argentina.

Break-even Costs.--Estimated 1957 costs of growing, packing, and shipping export citrus are given in Table 15. Cash costs of production are low--15-48 cents per box. Picking and packing export orange costs were twice as much as the cost of production of the fruit in every area except Misiones. The cost of packing materials is lower near Buenos Aires, but higher wages in these areas compensate for lower material costs.

Table 15.--Citrus: Estimated cash cost of production in indicated Argentine producing areas and break-even costs at Continental European ports, 1957.

Item	Buenos Aires	Entre Rios	Misiones	Salta & Jujuy	Tucuman
	U.S. dol. per box	U.S.dol. per box	U. S. dol. per box	U.S.dol. per box	U.S.dol. per box
Cash cost of production	0.15	0.33	0.48	0.28	0.25
Picking and packing	.87	.87	.87	.87	.87
Freight to rail head	--	--	.25	--	--
Freight to Buenos Aires	.11	.17	.32	.38	.33
Total f.o.b. Buenos Aires	1.13	1.37	1.92	1.53	1.45
Sea freight to continental Europe	1.82	1.82	1.82	1.82	1.82
Total break-even cost c.i.f. continental European ports 1/	2.95	3.19	3.74	3.35	3.27

1/ Add 13 U.S. cents per box for precooling in Buenos Aires.

Domestic freight charges are shown in Table 15.

Break-even costs per packed export box f.a.s. Buenos Aires are lower for San Pedro, Buenos Aires, and Concordia, and Entre Ríos than for the interior areas, illustrating the cost advantage of producing citrus near Buenos Aires.

The refrigerated sea freight to continental European ports was 13 shillings, $1.82 per box in 1957.

The break-even costs of Argentine citrus c.i.f. continental European ports ranged from $2.95 to $3.74 per box depending on the producing area. Fruit cooled in Buenos Aires bears an additional expense of 13 cents per box.

Break-even costs of Argentine citrus in continental Europe are comparable with South Africa and Brazil. In 1957, any sale of Argentine citrus at $4.00 per box in continental ports paid all cash costs of production and marketing costs.

Table 16.--Citrus: Estimated supply and utilization, by variety, Argentina, 1956.

Variety	Supply			Utilization			
						Fresh consumption	
	Harvested production	Imports	Total supply	Exports	Products	Total	Per capita 1/
	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	Pounds
Oranges	7,500	302	7,802	110	400	7,292	26
Tangerines	2,500	--	2,500	--	--	2,500	9
Lemons	1,400	1	1,401	7	200	1,194	4
Grapefruit	350	27	377	10	20	347	2
Total	11,750	330	12,080	127	620	11,333	41

1/ Apparent disappearance.

MARKETING

Utilization

In 1956, citrus utilization was estimated at 94 percent fresh domestic, 5 percent products, and 1 percent exports. (Table 16) The estimate of domestic fresh consumption is generous since only lemons are available in volume the year round. (Table 17) A large part of Argentina's 19 million people live in rural areas away from the centers of citrus production. The consumption levels indicated for 1956 average about 26 pounds of oranges per capita, 9 pounds of tangerines, 4 pounds of lemons and 2 pounds of grapefruit.

Low purchasing power and high transportation cost make it unlikely that average fresh domestic utilization is likely to increase in the near future. Exports and utilization for products will increase, however.

Domestic Marketing

Citrus is produced in isolated temperate areas and must be transported long distances with poor facilities. This enforces a discipline in packing which has aided the development of good marketing practice. Large quantities of bulk oranges are still sold in Buenos Aires but the trend is toward packed, graded fruit.

The washing, grading, and color-add equipment is shown in the interior of this modern packing plant. Such plants are found at Saladas in Corrientes, Monte Carlo, El Dorado, and Pindapoy in Misiones, and at Concordia in Entre Ríos.

Transportation is a great problem. Railroads run out of Buenos Aires as spokes in a wheel. Their gage varies and rolling stock serving one area cannot be used for another.

Buenos Aires is the major domestic market. Citrus consumption is highest there and in citrus-producing areas. Many small towns away from citrus areas are only lightly supplied.

Domestic and export trade is handled by Buenos Aires fruit dealers. They are packers, receivers, and wholesalers. They also

Table 17.--Oranges, lemons, and grapefruit: Comparison of representative wholesale prices and deliveries, by month and producing area Buenos Aires, 1954 and 1956.

Commodity and area	January	February	March	April	May	June	July	August	September	October	November	December
Wholesale prices, 1956 1/	U.S.dol. per box	U.S.dol. per box	U.S.dol. per box	U. S. dol. per box	U.S.dol. per box	U.S.dol. per box	U.S.dol. per box	U.S.dol. per box	U.S.dol. per box	U.S.dol. per box	U.S.dol. per box	U.S.dol. per box
Oranges:												
Salta-Jujuy	--	2.50	1.90	2.22	1.00	1.00	1.75	2.22	1.55	1.58	1.65	1.52
Buenos Aires	--	1.38	1.40	--	.92	1.00	.95	1.02	1.05	.88	.95	1.25
Misiones	1.55	--	2.15	2.68	1.25	1.00	1.00	1.12	1.00	1.45	1.70	1.65
Entre Rios	1.00	--	--	--	.70	.78	.70	.60	.78	.92	1.45	2.85
Corrientes 2/	--	--	--	--	--	--	--	--	--	--	--	--
Brazil	2.15	2.12	--	--	--	--	--	--	--	--	3.30	2.98
Lemons:												
Salta-Jujuy	3.80	5.22	4.25	1.30	1.08	--	--	.75	1.50	2.25	1.30	1.02
Buenos Aires	4.30	--	4.08	2.20	.88	.80	.85	1.05	1.02	.88	1.22	.62
Tucuman	5.75	4.25	5.48	2.00	--	.90	.75	1.00	.80	1.30	1.50	1.22
Entre Rios	--	3.50	1.65	--	--	1.00	1.12	1.20	--	1.00	1.88	2.00
Misiones 2/	--	--	--	--	--	--	--	--	--	--	--	--
Grapefruit:												
Salta-Jujuy	--	--	--	1.25	1.68	2.12	1.65	1.78	2.20	2.15	2.12	1.50
Buenos Aires	--	2.00	--	1.50	--	--	1.00	1.00	1.25	.80	1.12	1.32
Misiones	--	--	2.00	1.75	1.58	1.18	1.42	1.15	3.75	1.25	--	--
Paraguay	--	--	2.10	1.42	1.70	1.30	2.15	.55	.50	.25	.25	--

Table 17.--Oranges, lemons, and grapefruit: Comparison of representative wholesale prices and deliveries, by month and producing area Buenos Aires, 1954 and 1956--continued.

Commodity and area	January	February	March	April	May	June	July	August	September	October	November	December	Total
	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes
Deliveries, 1954 1/													
Oranges:													
Salta-Jujuy	10	8	12	33	46	32	30	43	51	51	79	84	479
Buenos Aires	1	--	--	--	9	22	31	47	50	55	28	14	257
Misiones	5	5	33	100	170	68	21	29	65	144	256	106	1,002
Entre Rios	4	--	--	12	35	30	40	82	137	170	101	77	688
Corrientes	1	1	2	3	35	145	242	285	211	107	91	10	1,133
Total 3/	21	13	49	150	306	307	371	497	532	546	573	316	3,681
Lemons:													
Salta-Jujuy	11	8	7	2	2	1	1	3	4	2	4	14	59
Buenos Aires	6	1	1	8	12	19	16	9	6	18	15	16	127
Tucuman	32	15	25	14	16	3	10	19	32	41	28	39	274
Entre Rios	1	--	--	1	2	3	8	10	12	16	30	15	98
Misiones	5	21	39	15	4	1	--	--	2	1	6	12	106
Total 4/	56	51	87	46	43	33	38	47	64	86	90	101	742
Grapefruit:													
Total	--	2	6	17	24	22	29	37	35	32	27	6	237

1/ Converted at 40 pesos to the dollar.
2/ Prices in comparable packages not available.
3/ Includes 104,000 boxes from Tucuman and 18,000 boxes from other areas.
4/ Includes 78,000 boxes from other areas.

represent some of the large estate packers. These fruit firms sell purchased fruit for their own account by private treaty or by auction. Several of the largest firms are also citrus growers.

In addition to the fruit dealers, the government runs a national market organization. Growers who do not have an outlet may send fruit to this market to be sold under government supervision at established commissions by assigned fruit dealers. These dealers keep records of price and supervise returns of proceeds of the sale.

Wholesale orange, lemon, and grapefruit prices in Buenos Aires in 1956 and deliveries by producing area and month in 1954 are given in Table 17. In the hot summer months of short supply, November to March, orange prices were about $2.00 per box; double the May to August prices. In the November-March season imported Brazilian oranges are sold. Most Brazilian fruit sold in January and February has been cold stored in Buenos Aires.

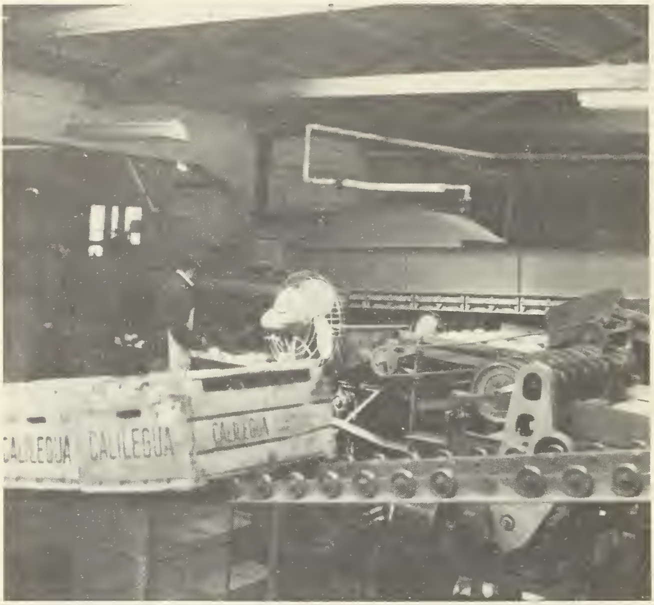
This packinghouse at Tucumán is equipped with machinery from Brazil.

Oranges from Salta and Jujuy sell at the highest prices. In the summer months, January, February, and March, lemons from Salta and Tucumán sold at prices of $3.80 to $5.75 per box.

March through July, some grapefruit from Paraguay was sold at $1.50 to $2.15 per box. Later sales were at lower prices because of the poor condition of the fruit.

In 1954, Buenos Aires received 3.7 million boxes of oranges of which 1.1 million were seedlings from Corrientes, 1.0 million were from Misiones, 700,000 from Entre Ríos, 500,000 from Salta and Jujuy and 300,000 from Buenos Aires. (Table 17) Lemon deliveries totaled about 750,000 boxes of which 275,000 were from Tucumán, 125,000 from Buenos Aires and 100,000 from Misiones. In addition, considerable "back yard" production of lemons in the city of Buenos Aires supplemented supplies.

Grapefruit is not widely consumed and only 240,000 boxes were delivered to Buenos Aires in 1954.



A small well-equipped packinghouse was visited on a sugar estate in the Province of Salta.

There is no coordination of domestic marketing. Fruit is sent to market from the widely dispersed producing areas as it is harvested and packed. This has not created any serious marketing problems because the Buenos Aires market has been undersupplied. This situation will change in the next few years as increasing quantities of commercial citrus are available from the new plantings.

If increased supplies result in lowered domestic prices, the incentive to export will be increased.

Argentina has imported oranges from Brazil in October and November for about 40 years.

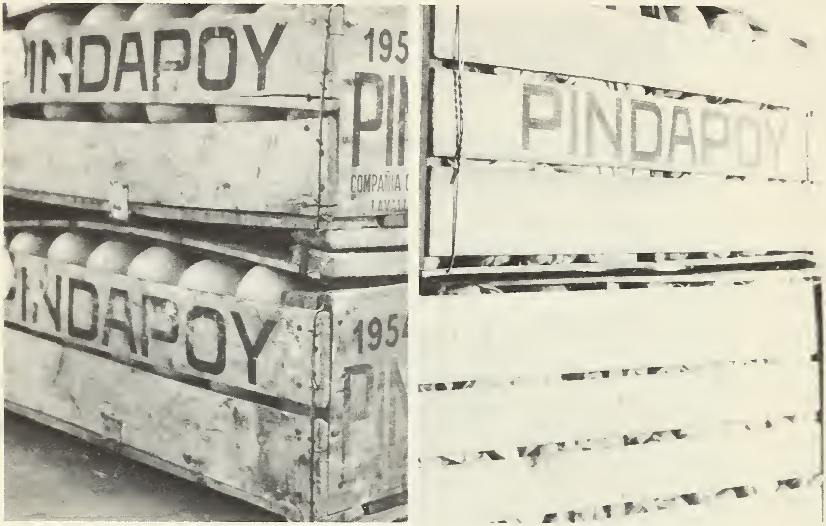
The increase in Argentine orange production together with unfavorable currency exchange rates with Brazil is expected to curtail these imports with only a small volume being shipped in the future.

Table 18.--Oranges, lemons, and grapefruit: Total exports from and imports into Argentina, 1938-56.

Year	Exports			Imports		
	Oranges	Lemons	Grapefruit	Oranges	Lemons	Grapefruit
	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes
1938	--	(1/)	--	1,830	63	--
1939	--	1	--	2,570	6	--
1940	--	(1/)	--	2,638	12	--
1941	--	--	--	2,279	6	--
1942	--	(1/)	--	1,780	9	--
1943	--	(1/)	--	1,764	18	--
1944	--	(1/)	--	1,608	3	--
1945	--	(1/)	--	1,564	5	--
1946	--	(1/)	--	1,326	1	--
1947	--	(1/)	--	1,473	8	--
1948	--	(1/)	--	1,672	(1/)	--
1949	--	--	--	1,140	--	--
1950	--	--	--	1,316	--	--
1951	--	(1/)	--	743	--	--
1952	--	5	--	496	--	--
1953	--	(1/)	--	339	--	--
1954	--	10	--	618	--	--
1955	--	2/ 1	--	848	--	56
1956	2/ 110	2/ 7	2/ 10	3/ 302	3/ 1	3/ 27

1/ Less than 500 boxes.
2/ Estimated.
3/ Most oranges were from Brazil. All lemons and grapefruit were from Paraguay.

Argentina is beginning to export citrus to Europe. In 1956 (Table 18), Argentina exported about 110,000 boxes of oranges, 7,000 boxes of lemons, and 10,000 boxes of grapefruit. Shipments in 1956 were experimental. In 1957, citrus exports reached 190,000 boxes of oranges, 13,000 boxes of lemons, and 15,000 boxes of grapefruit. It has regulations for citrus exports. They are inspected for grade and condition by the Ministry of Agriculture.



Left, type of returnable container used to ship unwrapped fruit to Buenos Aires. Right, full wrap pack of lemons for export.

In the future Argentina may become important in the late European summer orange market. Orange exports could reach a million boxes by 1965.

Future lemon exports will probably not exceed 100,000 boxes per year, but grapefruit exports could increase to 250,000 boxes per year.

Export Season.--Oranges are available for export May through November; lemons and grapefruit May through September. (Tables 17 and 19) Considering the time for transport to Europe, Argentine oranges can be available in Europe June to December; lemons and grapefruit June through October.

Argentina competes in Europe with oranges from South Africa, Brazil, and California; summer lemons from Italy, California, and Spain; and grapefruit from California and South Africa.

Table 19.-- Citrus: Exports by varieties and months, Argentina, 1956.

Month	Oranges	Lemons	Grapefruit
	1,000 boxes	1,000 boxes	1,000 boxes
January	--	--	--
February	--	--	--
March	--	--	--
April	--	(1/)	--
May	(1/)	2	--
June	(1/)	1	(1/)
July	(1/)	3	(1/)
August	5	1	7
September	22	(1/)	3
October	49	--	--
November	27	--	--
December	6	--	--
Total	110	7	10

1/ Less than 500 boxes.

Because of Argentina's late orange export season, the major volume of Argentine oranges will arrive in Europe after the peak of California Valencia arrivals and will compete primarily with South African Valencias from September through November.

Customers.--Argentina may be expected to market citrus in the same countries that are major markets for United States citrus. In 1956 Argentina's most important export customers were the Netherlands, the United Kingdom, and Germany in that order. These markets will probably continue to be major outlets but in the future Germany may increase in importance. (Table 20)

Foreign Exchange.--The value of the Argentine peso has fluctuated since World War II. The fluctuations are important to citrus exporters. In 1957, the free rate of exchange was about 44 pesos to the dollar. Citrus exports, both fresh and products, were made at the free rate of exchange less a sales tax of 8 percent, making the effective exchange rate on citrus exports to Europe about 40.5 pesos to the dollar. While exporters consider the 8 percent tax high, there are no indications that it has materially affected the country's citrus exports.

Table 20.--Citrus: Exports by varieties and country of destination, Argentina, 1956.

Country	Oranges	Lemons	Grapefruit
	1,000 boxes	1,000 boxes	1,000 boxes
Belgium	--	--	(1/)
Finland	(1/)	--	--
France	--	(1/)	--
Germany	6	--	(1/)
Netherlands	80	--	(1/)
Sweden	--	--	1
United Kingdom	24	7	8

1/ Less than 500 boxes.

Import and Export Prices.--In 1957, 200,000 boxes of Brazilian oranges were imported at a rate of 18 pesos to the exchange dollar. Brazilian oranges were reported to cost 133 pesos per 76-pound box f.o.b. Buenos Aires, $7.39 per box at 18 pesos to the dollar. This is an artificial exchange rate under the Brazilian-Argentine trade agreement. The cost of these oranges would be only $3.32 per box if the 133 pesos were converted at the export exchange rate of 40 pesos to the dollar. Due to the new exchange rate of 18 pesos to the dollar this purchase price is higher than in the past. Increases in the cost of Brazilian oranges will tend to restrict future trade.

European importers reportedly purchased oranges for $2.94 per box f.a.s. Buenos Aires in 1957. This was considered a satisfactory price.

Competitiveness of Argentine Citrus

The reception of Argentine oranges in European markets was good in 1956, considering that the fruit was unknown. In Rotterdam, prices of Argentine oranges were slightly lower than those for South African and California fruit, but better than prices for Brazilian fruit.

In 1957 larger quantities of Argentine oranges were exported and in Antwerp, Hamburg, Rotterdam, and London, they usually sold at higher prices than Brazilian fruit and nearly the same price as South

African oranges. Both California and Florida oranges sold at higher prices. (Table 21)

California oranges may be expected to sell at premiums, but the better color and appearance of Argentine oranges over the Brazilian product may make it more competitive.

In 1957, California lemons sold at substantial premiums over Argentine lemons in Hamburg and London. The United States may expect to continue to receive premium prices on lemons in the future, but Argentina can become more competitive by exporting better quality lemons than those sent to Europe in 1957.

Argentine grapefruit sold at lower prices than Florida and South African grapefruit in 1957. While Argentina does not now produce premium quality grapefruit, future export quality may be improved as new plantings come into production.

Import of U. S. Citrus

Argentina does not permit spending dollar exchange to import U.S. fruits. There are no indications that this situation will change in the near future.

From the standpoint of season and supply, trade between the United States and Argentina is feasible. In the hot summer, November to March, Argentina is short of citrus. In the summer of 1956, wholesale prices of lemons exceeded $5.00 per box and oranges $3.00 per box. No tangerines were available and limited quantities would probably find a good market. U.S. canned juices would also find a ready market.

Export Outlook

Argentina's export potential is increasing as new areas planted to improved varieties came into bearing. By 1965, Argentina can have a supply of 3 million boxes of exportable oranges, 400,000 boxes of lemons, and 300,000 boxes of grapefruit.

Considering domestic demand, it is unlikely that 1965 exports to Europe will exceed 1 million boxes of oranges or 250,000 boxes each of lemons and grapefruit. However, it is likely that Argentina will be a consistent summer exporter to Europe.

The Argentine citrus exporters have much to learn about selecting and packing fruit. The success of Argentina's deciduous industry

Table 21.--Citrus: Comparison of auction prices of oranges, lemons, and grapefruit of specified sizes on indicated dates, Antwerp, Hamburg, Rotterdam, and London, 1957

Variety, market and date	Auction price					
	Argentina	California	Florida	South Africa	Brazil	Italy
Oranges (288):	U.S.dol. per box	U.S.dol. per box	U.S.dol per box	U.S.dol. per box	U.S.dol per box	U.S.dol per box
Antwerp:						
Sept. 20	7.20-7.50	11.40-12.80	--	7.10-7.30	7.44	--
Sept. 27	8.30-8.40	11.00-12.00	--	8.00-8.10	7.50-7.64	--
Oct. 3	8.60-9.10	--	--	8.80-8.90	--	--
Oct. 29	7.44-7.70	--	7.60-8.80	8.10-8.20	9.80-11.60	--
Hamburg:						
Sept. 11	5.00-5.42	--	--	--	4.76-4.88	--
Oct. 23	8.09-8.87	--	--	--	6.90-7.50	--
Rotterdam:						
Sept. 19	7.57-7.70	8.82-11.84	--	7.11-7.63	5.20-7.50	--
Oct. 3	8.62-8.95	8.94	--	7.76-9.21	8.95-9.74	--
Oct. 17	8.95-9.21	9.86-11.06	10.80	8.95-9.47	9.08-9.47	--
London:						
July 9	4.34	--	--	7.28	--	--
Lemons (360):						
Hamburg:						
Sept. 11	4.82	5.72- 6.78	--	--	--	--
Sept. 25	6.49-6.97	7.98- 8.92	--	--	--	--
Oct. 1	6.49-6.97	8.10- 9.16	--	--	--	8.33-8.57
London:						
June 4	5.32	6.58	--	--	--	--
June 18	5.32-5.88	9.24	--	--	--	--
June 25	4.76	8.81- 9.52	--	--	--	--
July 9	4.90	10.50-10.56	--	--	--	11.20
Grapefruit (126):						
Antwerp:						
Oct. 11	7.80	--	9.60-10.20	--	--	--
Rotterdam:						
Oct. 10	7.24	--	8.02	--	--	--
London:						
June 25	9.24	--	--	9.38-9.73	--	--
July 2	6.02	--	--	8.54-8.96	--	--
July 9	7.28	--	--	8.96-9.10	--	--

Trade reports on Auction prices. Converted at official rates of exchange.

indicates that competency in the citrus export industry should be expected in the future.

Argentina can produce better table oranges than Brazil, and will compete with California Valencias and early Florida oranges in Europe from June to December. This will be new competition for U.S. summer orange exporters.

Both grapefruit and lemons will be less competitive than oranges.

PROCESSING

In 1956, total utilization of citrus for products was estimated at 620,000 boxes--400,000 boxes of oranges, 200,000 boxes of lemons, and 20,000 of grapefruit. By 1965, the total could reach 1 million boxes if the projected new plants in Entre Ríos and Salta are constructed. Processing techniques are simple and most plants are operated by Europeans.

Because all areas of production are infested with the Mediterranean and other fruit flies, orange and grapefruit products contain defects such as maggot eggs and insect particles in some lots. And juice produced from scale-covered fruit also may contain contaminating particles. Juice with these defects could not be imported into the United States.

In 1957, there were no citrus products exports from Argentina. The primary markets were bottlers and bakers in Buenos Aires.

The 1957 Buenos Aires prices of raw essential oil ranged from \$2.04 to \$2.27 per pound for orange oil and \$2.27 to \$3.40 for lemon oil. Citrus pectin (150 degree) sold for about \$1.70 per pound. The price for lemon juice in casks and preserved with SO_2 was reported at \$1.09 per U.S. gallon for a 4 to 1 concentrate. Orange juice in casks and preserved with SO_2 reportedly sold for \$1.27 per U.S. gallon for a 6 to 1 or 50 degree Brix concentrate. Processors estimated that this type of juice could be sold f.o.b. European ports for \$2.27 per U.S. gallon.

Processing costs are reasonable. Wages are low, but the cost of equipment is high. All tin plate is imported, mainly from England. Tin plate for canning export products may be imported without duty.

Lemons are unloaded at a Saladas processing plant
in the Province of Corrientes.

Varnish for coating cans is not available. In 1957, uncoated #2 cans with lids were quoted at about 8 U.S. cents each f.o.b. Buenos Aires. Some citric acid and lemon oil is produced at Tucuman, but most processing is concentrated in two provinces--Corrientes and Entre Ríos.

Corrientes

Corrientes had 5 plants in 1957, 3 at Bella Vista and 2 at Saladas, which used an estimated 250,000 boxes of fruit per year. All are small, simple installations. Two have equipment for concentrating juice, but none have cold storage facilities. The largest plant, at Bella Vista, is operated by a soft drink bottler.

Each plant produces pressed orange and lemon oil, which is extracted by Italian machines before juicing. The oil is collected in water and held in tanks for separation by flotation. The final separation is by centrifuge. Oranges yield about 7-1/2 pounds of oil per ton of fruit.

A simple concentrating "pan" in a Saladas processing plant illustrates the type of equipment used.

Most juice is extracted mechanically, and all is preserved with SO_2. Natural orange juice averages 13 to 15 degrees Brix and yields about 46 percent by weight.

Nearly all oranges are scale covered and produce contaminated juice. Some processors are considering moving to other areas where they can get clean fruit.

At Concordia, Entre Ríos, preserved and refrigerated juice, essential oil, citric acid and pectin are produced in Argentina's largest processing plant. The juice department's interior is shown above.

In 1957, processors were reported to be paying 20 U.S. cents per 70-pound box for dropped oranges, $7.50 per ton for picked oranges, and $12.50 per ton for picked lemons at the plant.

Entre Ríos

Entre Ríos has clean good quality fruit for fresh use. Oranges and grapefruit tend to be acid and more like the fruit of California than that of Florida. Lemons are of good processing quality. Juice characteristics are shown in Table 22.

The best processing facilities in Argentina are at Concordia, in Entre Ríos. Two plants were in operation in 1957, and they used about 250,000 boxes of citrus. This is about half of their combined capacity.

At the largest processing plant in Bella Vista waste peel is unloaded. The concentrator tower may be noted above the roof.

One of the two plants, the largest installation in Argentina, is operated by a Sicilian processor and is a modern installation using Italian-made automatic juice extractors. It reportedly has a capacity of 100 tons of fruit per day and produces orange and lemon juice concentrate, orange and lemon essential oil, citric acid, and pectin. Most juice concentrate is preserved with SO_2, but nonpreserved concentrate can be produced. The plant has available cold storage facilities for 300 tons of concentrated juice. Pectin is produced by the alum method.

Lemon peel is dried during the major lemon harvest season (April-September). The dried peel is used to manufacture pectin when lemons are in short supply.

Concordia's other processor produces small quantities of canned single-strength grapefruit juice in addition to preserved juice for bottlers.

In 1957, processors were reported to be paying $16 per ton for oranges and $12.50 per ton for lemons at the plant.

Two new plants are planned for the Entre Ríos area in the next two years. They may be equipped with U.S. machinery.

Table 22.--Oranges, lemons, and grapefruits: Juice characteristics at Concordia, Entre Ríos, 1954.

Variety and month of test 1/	Juice characteristics			
	Juice content	Acidity	Sugar-acid	Brix
Oranges:				
Valencias:	Percent	Percent	Ratio	Degrees
October	57	0.94	1:10.53	9.90
November	47	1.00	1:11.00	11.00
Grapefruit:				
Marsh seedless:				
October	38	1.11	1:8.55	9.50
November	33	1.14	1:7.14	8.15
Lemons:	ML in 10 fruits	Grams per 100 ML of Juice		
Genova:				
May	380	5.84	1:1.60	9.38
June	600	5.34	1:1.69	9.02
July	520	5.74	1:1.60	9.20
August	480	5.72	1:1.59	9.10
September	366	5.45	1:1.62	8.85
October	520	3.31	1:1.73	9.20
November	500	4.91	1:1.59	7.80
December	450	5.19	1:1.64	8.55

1/ Oranges and grapefruit on Trifoliae orange root, lemons on sour orange root. Estacion Experimental De Concordia.

OUTLOOK

It is likely that processing capacity will be increased in the next 5 years by the construction of plants at Salta and Concordia. If these new plants are built, Argentina may be forced into the products export market because increased quantities of products will be in excess of domestic demand. Lemon products will be competitive with U.S. lemon products, but orange juice will have no competitive advantage.

It is unlikely that Argentina could compete in world markets with canned orange or grapefruit juice because of container

A part of the equipment for the production of pectin by alum method illustrates the modern methods of this plant.

costs and acidity of juice. Juice containing sugar is subject to high duties in most European markets which will limit Argentina's export opportunities with sugar-added juice. Argentina has no advantages which would encourage the development of a large processing industry.

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